SOIL SURVEY

Morgan County Alabama

Series 1944, No. 10

Issued September 1958

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with the
ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
the
ALABAMA AGRICULTURAL EXPERIMENT STATION
and the
TENNESSEE VALLEY AUTHORITY

How To Use THE SOIL SURVEY REPORT

FARMERS who have lived in one locality for a long time come to know about the soil differences on their own farms and on those of their immediate neighbors. What they do not know, unless a soil survey is made, is how nearly their soils are like those on experiment fields or other farms from which higher yields are reported. They do not know whether these higher yields are from soils like their own or from soils so different that they could not hope to get equally high returns, even if they adopted the practices followed in those places. The similarities and differences among soils are known only after a map of the soils has been made. Knowing what kind of soil one has and comparing it with soils on which new developments have proved successful will remove some of the risk in trying new methods and varieties.

SOILS OF A PARTICULAR FARM

To find what soils are on any farm or other land, locate the tract on the soil map that accompanies this report. This is easily done by finding the township in which the farm is located and by using landmarks, such as roads, streams, villages, and dwellings, to locate boundaries.

Each kind of soil mapped within the farm or tract is marked on the map with a symbol. For example, all the areas marked Ts are Tilsit silt loam, undulating phase. The color in which the soil area is shown on the map will be the same as the color indicated in the legend for that particular type of soil. If you want information on this Tilsit soil, turn to the section in this publication, Soil Types and Phases, and find Tilsit silt loam, undulating phase. Under this heading you will find a statement of what the characteristics of this soil are, what it is mainly used for, and some of the uses to which it is suited.

Suppose, for instance, you wish to know the productivity of Tilsit silt loam, undulating phase, under cultivation. You will find this soil listed in the left-hand column of table 6, and in the columns to the right you will find the expected acre yields for important crops. Compare the yields given for this soil with those listed for other soils in the county.

In addition, if you wish to know what is good use and management for Tilsit silt loam, undulating phase, read what is said about this in the section headed Use and Management of Morgan County Soils, where the soils suited to the same uses and management practices are discussed.

SOILS OF THE COUNTY AS A WHOLE

If a general idea of the soils of the county is wanted, read the section on soil associations, which tells about the principal kinds of soils, where they are found, and how they are related to one another. After reading this section, study the soil map and notice how the different kinds of soils tend to be arranged in different parts of the county. These patterns are likely to be associated with well-recognized differences in types of farming, land use, and land use problems.

A newcomer to the county who considers purchasing a farm will want to know about the climate; the types and sizes of farms; the principal farm products; the availability of roads, railroads, and electric services; water supplies, industries of the county; and population characteristics. This information will be found in the section, General Nature of the Area, and the section, Agriculture.

Those interested in how the soils of the county are formed and how they are related to the great soil groups of the world should read the section Morphology and Genesis of Soils.

This publication of the soil survey of Morgan County, Ala., is a cooperative contribution from the—

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SOIL SURVEY OF MORGAN COUNTY, ALABAMA

By HOYT SHERARD, in Charge, and C. L. McINTYRE, Alabama Department of Agriculture and Industries; H. J. WESSON and R. S. FARNHAM, Alabama Agricultural Experiment Station; and A. H. HASTY, ROBERT WILDERMUTH, and G. A. SWENSON, Soil Survey,[1] Soil Conservation Service

Area inspected by J. W. MOON, Soil Scientist, Soil Survey

United States Department of Agriculture in cooperation with the Alabama Department of Agriculture and Industries, Alabama Agricultural Experiment Station, and Tennessee Valley Authority

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[1] Field work for this report was done when Soil Survey was a part of the Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration. Soil Survey was transferred to the Soil Conservation Service on Nov. 15, 1952.

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MORGAN COUNTY is characterized by elevated plateaus and broad valleys that are suited to agriculture or forest and by steep escarpments on the mountain slopes. Practically all of the original forest has been cut over, but hardwoods and pine or redcedar have come in on the rocky areas and mountain slopes. The county is predominantly agricultural. Except for the steep and stony places, most of the land is suitable for pasture and much of it can be tilled. The soils respond to good management.

Cotton, corn, oats, wheat, and hay are the chief field crops. Cotton is the principal cash crop, but some income is derived from market vegetables, livestock, poultry, and dairy products. The average grazing season lasts about 245 days and can be extended if winter cover crops are grown.

To provide a basis for determining the best uses of the land, this cooperative soil survey was made by the United States Department of Agriculture, the Alabama Department of Agriculture and Industries, the Alabama Agricultural Experiment Station, and the Tennessee Valley Authority. Field work was completed in 1942, and, unless otherwise specifically indicated, all statements in this report refer to conditions in the county at that time.

GENERAL NATURE OF THE AREA

LOCATION AND EXTENT

Morgan County is located in the north-central part of Alabama (fig. 1). It is bordered on the north by the Tennessee River and on the other three sides by the Alabama counties of Cullman on the south, Marshall on the east, and Lawrence on the west. Its total area is about 594 square miles. Of this, slightly more than 17 square miles is occupied by the Wheeler Reservoir. Decatur, the county seat, with a population of nearly 20,000 in 1950, is in the northwestern part.

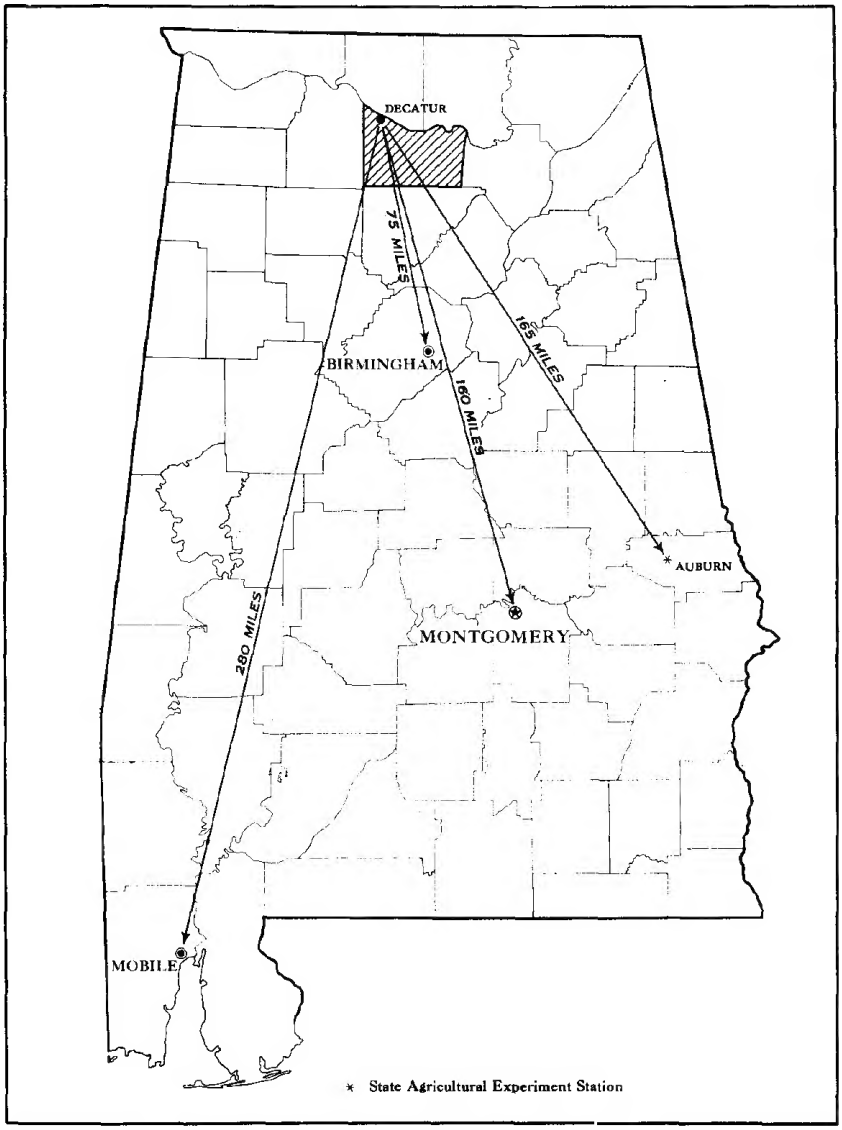


FIGURE 1.—Location of Morgan County in Alabama.

PHYSIOGRAPHY, RELIEF, AND DRAINAGE

Morgan County is in the Tennessee River valley. Originally, the area was probably a nearly level plateau gently inclined toward the south, but it now has a series of upland plateaus, wide valleys, steep escarpments, and many small isolated mountains and knolls. The uplands are remnants of a rather smooth-topped plateau. The valleys, nearly level to rolling or sloping, have formed where the

underlying materials were less resistant to erosion. Within the valleys, however, are many small isolated mountains and knolls. These remain because they consisted of materials more resistant to geologic erosion.

PHYSIOGRAPHY AND RELIEF[2]

There are five distinct physiographic divisions in the county: (1) Redlands and alluvial plains; (2) rough mountain slopes; (3) Little Mountain plateau; (4) low limestone ridges and valleys; and (5) Sand Mountain plateau (fig. 2).

Redlands and alluvial plains.—This physiographic division extends along the Tennessee River from Laceys Spring on the east to the county line on the west. This area is underlain by the Tuscumbia (or St. Louis) limestone, which is gray to blue and contains some interstratified chert. Little rock is on the surface, except in a few small isolated areas. The weathering of Tuscumbia limestone has given rise to many of the red soils. The area this limestone underlies has been altered somewhat by erosion and stream action. A major portion of the soils in this section are of alluvial and colluvial nature. The surface is undulating to gently rolling; a major part of it has slopes of 2 to 6 percent. The drainage is partially affected by underground channels. The elevation ranges from 556 feet, the Wheeler Reservoir high water mark, to about 670 feet above sea level. Decatur lies at 591 feet, Flint at 670, and Trinity at 633 feet.

Rough mountain slopes.—The stony eroded soils that make up this division lie north of the Little Mountain and the Sand Mountain plateaus (fig. 2).

Little Mountain plateau.—North of the low limestone ridges and valleys lies Little Mountain plateau on the Hartselle sandstone formation (fig. 2). It ranges from 2 to 8 miles wide and reaches elevations of 600 to 725 feet above sea level. Hartselle and Somerville are centrally located in this area, and their elevations are 660 and 718 feet above sea level, respectively. The highest point in this section is 800 feet, on a ridge just north of Somerville.

This plateau section is about 50 to 150 feet above the Moulton-Cotaco Valley to the south. Like Sand Mountain, it is a remnant of an old plateau, fairly smooth on top, but ragged along the northern edge where heads of streams have cut back into it. The dominant relief of the plateau is nearly level to rolling. The Hartselle sandstone formation, which underlies the plateau, consists of gray, red, or yellow sandstone, together with associated acid shales. The plateau dips slightly to the south. Along its northern rim, the sandstone appears to be rather thick bedded, but as it extends into this county it is somewhat thin bedded (pl. 1, *A*), and more or less interbedded with layers of shale.

Low limestone ridges and valleys.—Immediately north of the Sand Mountain plateau lies Moulton Valley to the west, Flint Valley in the center, and Cotaco Valley to the northeast. These three valleys are known collectively as the Moulton-Cotaco Valley (fig. 2). This undulating to rolling area (pl. 1, *B*) ranges from 575 to 625 feet above

[2] Elevations cited in this section are from U. S. Geol. Surv. topographic maps.

sea level. It is 250 to 450 feet below the top of the Sand Mountain plateau to the south. The soils of this valley have formed chiefly from material weathered from Bangor limestone, which is massive, gray to blue, and highly fossiliferous. Water action has moved and mixed these soils considerably. A major part of them is now made up of or is influenced by colluvial and alluvial material. This Bangor formation, known to be as much as 500 feet thick, tilts southward and is sandwiched between the Pottsville formation above and the Hartselle sandstone beneath.

Sand Mountain plateau.—The Sand Mountain plateau, which is underlain by rocks of the Pottsville formation, occupies the southern part of the county. The highest elevations in this area range from 1,000 feet above sea level, near Eva in the south-central part, to 1,200 feet at Morgan City in the east-central part. The Pottsville formation is a succession of beds of acid shale and sandstone. Shale influence is more pronounced in the soils around Eva and Hulaco than around West Point and Morgan City.

DRAINAGE

Morgan County lies wholly within the Tennessee River drainage system. The courses of the main streams are shown in figure 2. Flint Creek and its tributaries drain most of the western half of the county. Cotaco Creek and its tributaries drain most of the eastern half. The county as a whole is fairly well drained. The largest poorly drained areas occur in the physiographic divisions called "low limestone ridges and valleys" and "redlands and alluvial plains." In some small depressions on the Little Mountain plateau, water stands all or much of the year. Water for domestic use is generally available in all parts of the county.

In many places drainage reaches the valleys through underground channels and forms springs along the edges of the valleys (pl. 1, *A*). Numerous sinks occur in the county, among which is Newsome Sinks near the eastern border. There are many large caves. In a few places along the north slopes of the mountains, small waterfalls occur during rainy seasons. Nearly all the streams flow rather swiftly, especially in the higher areas.

CLIMATE

The climate is continental and temperate. The average yearly range is only 35° F. between summer and winter. During winter, temperatures occasionally drop to 0°, but such cold seldom lasts longer than 2 to 4 days. Although the cold periods are somewhat detrimental to livestock, winter cover crops, small grains, and vegetables, they probably help control some of the insects. Mild, comfortable weather may be expected any time during the winter and may continue for several consecutive days. Winter legumes, oats, wheat, and rye, if well rooted, are seldom completely destroyed by cold. Farm work may be carried on throughout most of the winter. The summers are generally long and hot, but the winds from the plateaus have a tempering influence, and the nights are usually pleasant.

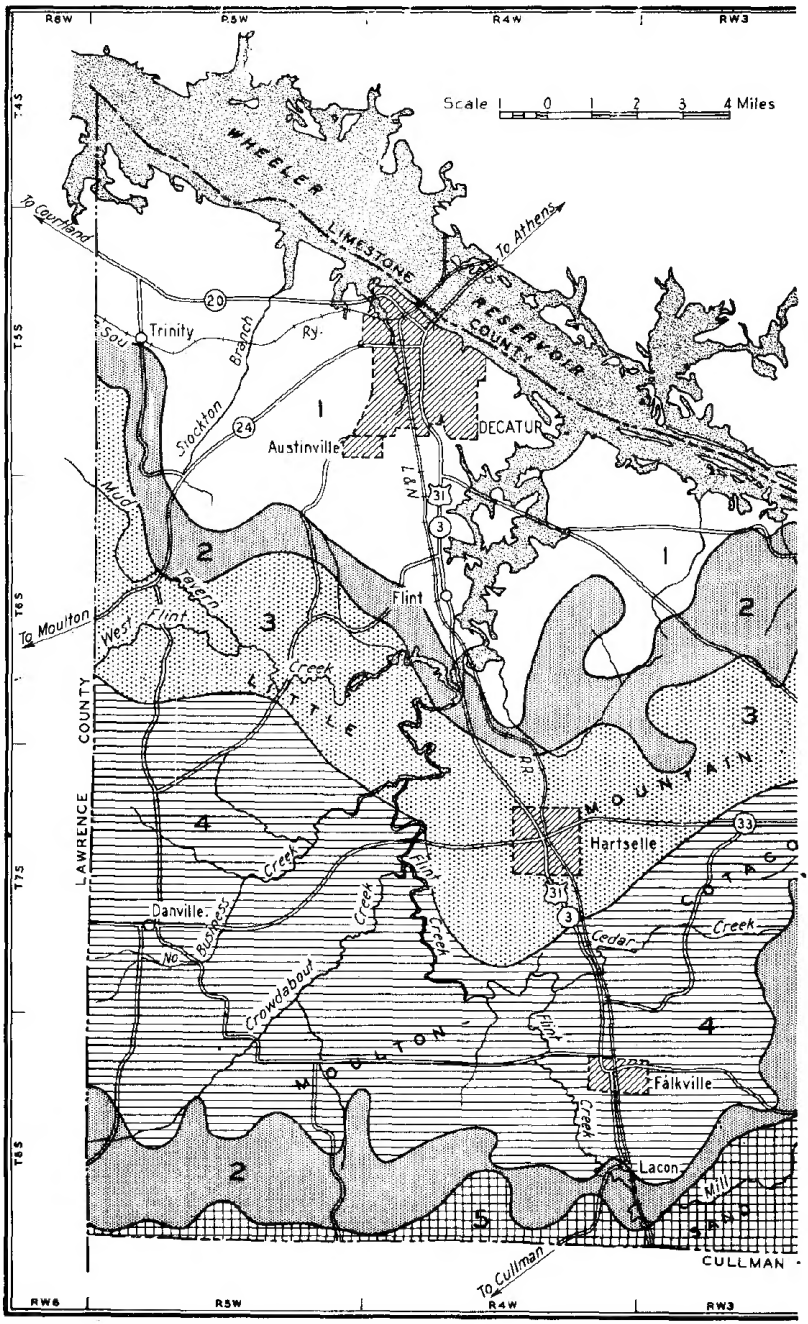
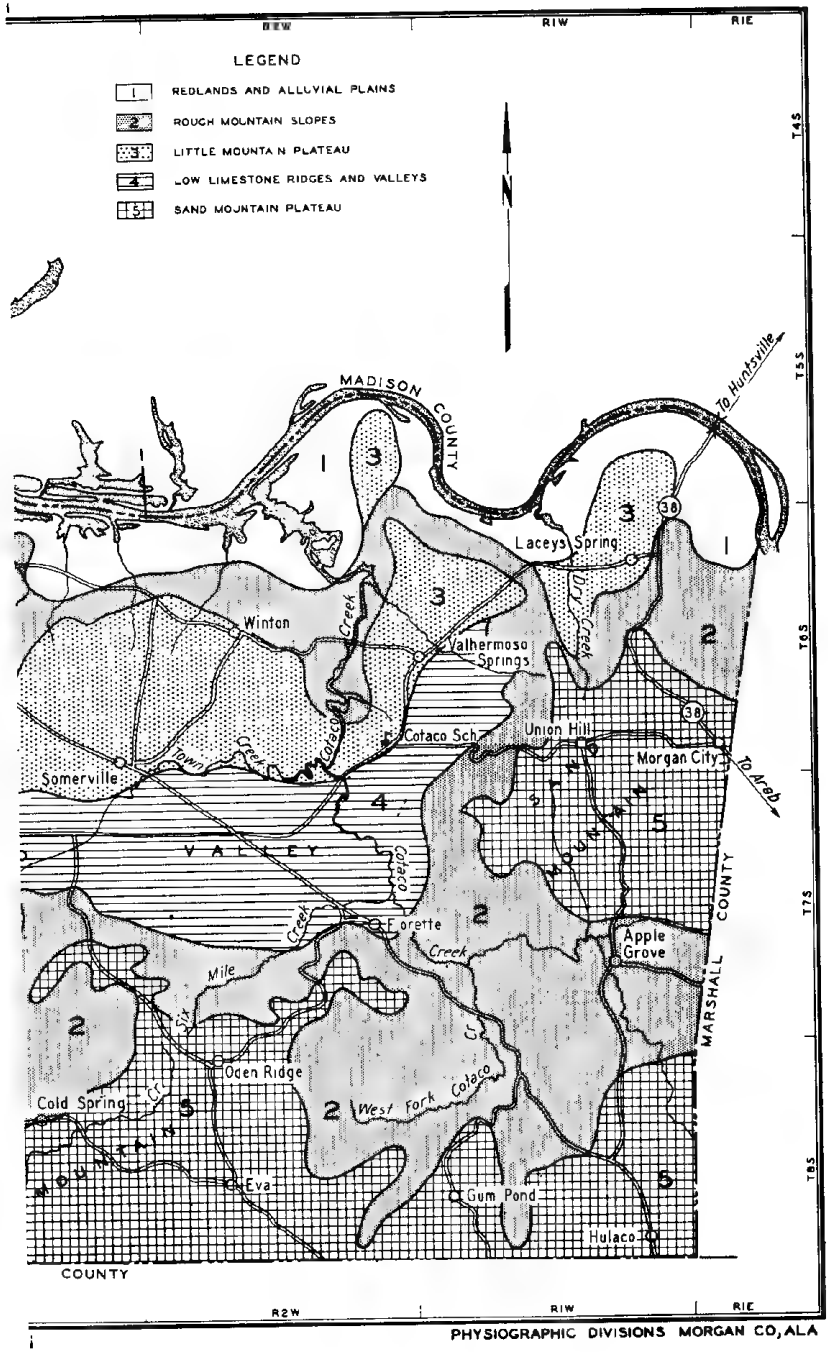


FIGURE 2.—Physiographic map of Morgan



County, Ala., showing the drainage system.

Table 1 gives the normal monthly, seasonal, and annual temperature and rainfall shown by the records of the United States Weather Bureau station at Decatur. These data are considered representative, except that the higher mountain sections have slightly lower temperatures in both winter and summer.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Decatur, Morgan County, Ala.*

[Elevation, 573 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1904)	Total for the wettest year (1932)	Average snowfall
	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*
December	45. 5	76	0	5. 04	4. 50	9. 68	0. 6
January	42. 4	79	−5	4. 63	1. 90	8. 46	. 6
February	44. 0	84	−12	4. 43	1. 25	6. 91	. 9
Winter	44. 0	84	−12	14. 10	7. 65	25. 05	2. 1
March	53. 1	93	4	5. 62	7. 60	3. 89	. 1
April	61. 8	92	26	4. 48	2. 78	4. 25	[3]
May	70. 0	100	34	3. 83	3. 04	1. 97	0
Spring	61. 6	100	4	13. 93	13. 42	10. 11	. 1
June	77. 9	108	47	3. 79	1. 51	6. 53	0
July	80. 3	107	54	4. 35	5. 39	4. 05	0
August	79. 3	106	52	3. 91	2. 91	8. 09	0
Summer	79. 2	108	47	12. 05	9. 81	18. 67	0
September	74. 1	104	36	2. 37	1. 60	2. 37	0
October	62. 2	100	27	3. 07	. 30	8. 83	0
November	50. 9	85	10	3. 20	1. 92	3. 72	. 1
Fall	62. 4	104	10	8. 64	3. 82	14. 92	. 1
Year	61. 8	108	−12	48. 72	34. 70	68. 75	2. 3

[1] Average temperature based on 73-year record, through 1954; highest and lowest temperatures on a 37-year record, through 1930.

[2] Average precipitation based on 76-year record, 1879–1954; wettest and driest years based on 76-year record, 1879–1954; snowfall, based on a 37-year record, through 1930.

[3] Trace.

The average annual rainfall of 48.72 inches is distributed rather uniformly throughout the year. The greatest amount falls during winter and spring, somewhat less during summer, and the least in fall. Yields of corn and hay may be reduced by lack of moisture, but the amount and distribution generally permit growing and maturing of the common crops. Sometimes heavy spring rains are followed by dry

periods. This unfavorable combination hinders the turning under of winter cover crops and preparing the land for seeding.

Summer rains usually are torrential or heavy and normally supply ample moisture for growing crops. Occasionally, torrential summer rains last long enough to overflow the bottom lands and injure the crops. Part of the bottom land along Cotaco and Flint Creeks is subject to such flooding. Cotton is generally damaged more from excess moisture than from subnormal rainfall.

Ordinarily, killing frosts occur any time between November 6 and March 26. Frost has been recorded as early as October 11 and as late as April 26. The average frost-free season of 225 days is sufficient for the maturing of most crops. Hardy vegetables such as cabbage, turnips, beets, collards, onions, carrots, radishes, and lettuce may be grown throughout the winter in normal years. The average grazing period is about 245 days. By using supplementary crops, such as crimson clover, vetch, alfalfa, Italian ryegrass, and small grains, the grazing period usually can be extended through the entire year.

WATER SUPPLY

Wells, springs, lakes, streams, and cisterns furnish ample water for man and livestock. Drinking water can be had in all parts of the county, but wells must be sunk to considerable depth on the upland plateaus. The pioneers settled near good springs. As population increased this source of water was not adequate for domestic use, and shallow wells and cisterns were dug. At present, drilled wells are most used. They range from 40 to 70 feet in depth, although in many places an ample water supply can be reached at 20 to 30 feet. In a few areas it is necessary to sink wells to 75 or 100 feet.

Wheeler Dam blocks the Tennessee River between neighboring Lauderdale and Lawrence Counties and forms Wheeler Lake along the northeastern border of Morgan County. This artificial lake furnishes opportunities for fishing, boating, swimming, and other water sports. Several small resorts and boating-renting camps are located along its borders.

VEGETATION

Approximately a third of Morgan County is forested. The larger forested areas are on the rough stony lands or mountainsides and on the first bottoms along the larger creeks (fig. 2). A few deciduous hardwood stands are virgin, but in the second-growth stands various species of pine are mixed with the hardwoods. About 1,500 acres of land has been reforested, of which 400 to 500 acres was reforested by private owners. Loblolly and shortleaf pines and black locust are the principal trees used for planting. The principal kinds of forest trees are post, white, red, and blackjack oaks, hickory, poplar, walnut, cherry, cedar, and pine. A more detailed account of the forests of the county is given on page 162.

WILDLIFE

The Wheeler National Wildlife Refuge extends along the Tennessee River and its tributaries from United States Highway No. 31 at Decatur to Hartselle. This refuge covers about 18,000 acres, of which about 10,000 acres is water. Local headquarters for the refuge are at

Decatur. The refuge is sponsored by the United States Department of the Interior, Fish and Wildlife Service. Quail have been released in the area and all game is protected. The Wheeler Reservoir is well stocked with game fish, as well as with many rough species.

ORGANIZATION AND POPULATION

The area now within Morgan County was part of territory ceded by the Cherokee Indians in 1816 at the Turkey Town treaty. The county was established February 8, 1818. It was a part of the Cherokee reservation until the Indians were removed in 1837.

The county was first called Cotaco for a large Indian-named creek that flows through the eastern part. In 1821, however, the name was changed to Morgan County in honor of G. Daniel Morgan of Pennsylvania, a general in the Revolutionary War. Somerville was incorporated December 19, 1819, and made the county seat. In 1821 the county seat was changed to Decatur, its present location.

The county was settled largely by immigrants from Virginia and the Carolinas, but many others came from Tennessee and Kentucky. The white population consists largely of descendants of these settlers (*4*).[3] According to the United States Census, the population of Morgan County was 52,924 in 1950. Decatur, with a population of 19,974 in 1950, is located in one of the better agricultural areas in the county. Hartselle is about 12 miles south of Decatur on the Louisville and Nashville Railroad and United States Highway No. 31. It had a population of 3,429 in 1950.

Decatur and Hartselle are the most important agricultural, trading, and shipping centers. Other towns that serve as shipping and trading centers are Flint, Falkville, Lacon, and Trinity. Although not on a railroad, Danville, Somerville, Austinville, Eva, Lacey Spring, Valhermoso Springs, Florette, Hulaco, Woodland Mills, Morgan City, and Priceville are located on good roads in fertile agricultural areas and also serve as trading centers.

INDUSTRIES

In 1944, between 70 and 75 manufacturing plants were located in Decatur and employed about 6,000 workers. The annual payroll was about $10 million. The industries in Decatur have stimulated truck farming in the surrounding areas. The vegetables produced are distributed to local stores and to homes. About 2½ million baby chicks are hatched annually in 5 hatcheries in the county. Local poultry farms supply a majority of the eggs for the hatcheries. Lumber mills and cotton gins also operate in the county.

TRANSPORTATION FACILITIES

The Louisville and Nashville Railroad crosses the county north to south and passes through Decatur, Flint, Hartselle, Falkville, and Lacon. The Southern Railway system traverses a corner of the county from east to west and passes through Decatur and Trinity.

Of some 1,100 miles of improved roads in Morgan County, about 70 miles is paved or hard-surfaced, and some 30 miles is unpaved

[3] Italic numbers in parentheses refer to Literature Cited, p. 192.

State and county highways. These highways, with the many graveled county roads, enable farmers to come to the shipping and trading centers throughout the year.

River transportation was stimulated by development of the Tennessee Valley power, navigation, and flood-control system. To date, however, no regular shipping service has been established. A few private companies and individuals ship some freight by river.

The county is well served by buses. Connections can be made from Decatur and Hartselle to the principal cities in the State. Taxis and buses carry many industrial workers to and from Decatur. Motor freight lines serve every trading center in the county. Cotton, cottonseed, and other farm products are hauled to the shipping points or mills by motor freight, and much of the fertilizer is delivered by motor lines.

COMMUNITY AND FARM HOME IMPROVEMENTS

Rural mail routes have been established throughout the county, and schools and churches are well distributed. Recently, many of the schools have been consolidated. All rural pupils living 2 miles or more from a school are transported by buses provided by the county school system. The majority of the school buildings have three rooms or more.

More than 3,700 rural homes had electricity in 1950. Many electric appliances are used, as well as electric motors for farm power. Electric fences are commonly used, especially to hold livestock on areas to be grazed temporarily. About 718 farms reported telephones in 1950. Privately owned telephone systems operating in the communities of Massey and Danville have switchboard connections with outside lines. Only 633 farms reported running water in the home in 1950.

The dwellings in the rural areas, especially in the valley, range from large well-built homes on the larger farms to very poor houses on some of the smaller farms or tenant farms. The dwellings and outbuildings on Sand Mountain are considerably better than those in the valley (pl. 2, *A*). Most of the farm homes have been kept in good repair in recent years.

AGRICULTURE

Indians practiced a crude agriculture in the area up to the early part of the nineteenth century. The first white settlers took land mainly along the Tennessee River, which afforded the only means of transportation. The redlands were the first to be cleared. Settlement spread to the Moulton Valley, and later to the smaller valleys and coves along Cotaco and Flint Creeks. The mountain section was considered unsuited to agriculture. Little attempt was made to clear the mountain plateaus until late in the nineteenth century. Now, this plateau region is well populated and is one of the better agricultural sections of the State.

Morgan County was predominantly agricultural from the early days. Early in the nineteenth century cotton growing became important in the valley section, where the Tennessee River provided a means of transportation. Cattle, hogs, and sheep were raised to some extent. The animals were marked and allowed to run on the open range. The oak forest throughout the greater part of the county

TABLE 2.—*Acreage of principal crops and number of bearing fruit and nut trees and grapevines in Morgan County, Ala., in stated years*

Crop	1929	1939	1949
	Acres	*Acres*	*Acres*
Cotton harvested	75, 011	41, 549	65, 927
Corn:			
For all purposes	44, 697	63, 650	53, 375
Harvested for grain	43, 417	62, 987	53, 116
Small grains threshed:			
Oats	26	412	1, 948
Wheat	[1] 38	[1] 310	359
Peanuts harvested for threshing	[2] 113	294	30
All hay (exclusive of sorghum)	5, 496	14, 810	12, 679
Alfalfa	56	164	1, 513
Clover and timothy, alone or mixed	82	98	347
Lespedeza	([3])	11, 872	5, 990
Small grains cut for hay	491	391	483
Other hay cut	[4] 4, 867	[4] 2, 285	4, 346
Seed crops harvested for sale:			
Crimson clover	([3])	([3])	644
Lespedeza	([3])	([3])	286
Vetch	([3])	([3])	132
Other field seed crops including winter peas	([3])	([3])	25
Potatoes for sale or home use	525	820	[5] 273
Sweetpotatoes for sale or home use	[6] 349	[6] 682	[5] 157
Sorghum for sirup	264	425	[7] 64
Strawberries harvested for sale	37	72	18
Tomatoes	15	18	97
Watermelons	75	43	68
	Number [8]	*Number* [8]	*Number* [8]
Apple trees	18, 582	19, 704	16, 565
Peach trees	24, 946	33, 013	30, 511
Pear trees	3, 494	2, 835	2, 199
Pecan trees	449	1, 181	1, 335
Plum and prune trees	1, 959	2, 847	1, 763
Grapevines	7, 771	11, 617	9, 719

[1] Winter wheat.
[2] Peanuts grown alone for all purposes.
[3] Not reported.
[4] Reported in the census as "Other tame grasses."
[5] Does not include acres for farms with less than 15 bushels harvested.
[6] Includes yams.
[7] Includes sugarcane for sirup.
[8] Number in the census year, which is 1 year later than the year at head of columns.

furnished considerable mast for hogs. Cattle ran at large over the southern part of the county and were driven in the fall to the Tennessee River bottoms to winter in the cornfields and canebreaks. Wild grasses furnished some hay for livestock.

After the Civil War much of the tilled land that had been thrown out of cultivation was planted to agricultural crops. As the population increased the forest-covered plateaus were largely converted into farms. Roads were built, at first to boat landings along the Tennessee River and later to shpping points on the railroad lines. What is now the Southern Railway was in operation by 1858, and the Louisville and Nashville was put in operation through Morgan County in 1872.

With improved means of transportation, cotton became an important crop in all parts of the county. More recently, corn, hay, and forage crops have been extensively grown.

CROPS

Cotton and corn are the main crops in Morgan County, but hay and forage are also important. The increase in acreage of hay and forage has been accompanied by a decrease in the acreage of small grains. Legumes harvested for seed, peanuts, sorghum for sirup, potatoes, and sweetpotatoes are among the minor crops grown. Vegetables, fruits, and nuts are grown mainly for home use. The acreage of watermelons and tomatoes grown for sale has increased recently. Table 2 shows the principal crops of the county and the number of bearing fruit and nut trees and grapevines in stated years.

COTTON

Cotton has long been the most important cash crop. Because the soils and climate are suitable, cotton production steadily increased until 1929, when this crop was grown on 75,011 acres. The increase in cotton acreage was brought about mainly by decreasing the acreages planted to cereals, hay, and forage. In 1939, under the Federal acreage allotment program, the acreage in cotton was reduced to 41,549. In 1949, however, the acreage had increased to 65,927.

Improved methods of farming have brought outstanding increases in yield of cotton per acre. Introduction of earlier maturing varieties, use of winter cover crops, and application of larger amounts of fertilizer have helped in producing the higher yields.

CORN

Corn has long been second to cotton in acreage and is the leading cereal crop. Recently, improved varieties, good management, and use of winter legumes have increased average yields per acre. Corn not consumed on the farm is ordinarily sold at local markets.

SMALL GRAINS AND SEED CROPS

Wheat and oats are grown on comparatively small acreages. Oat harvest comes in spring at about the time when need for labor in the cottonfields is greatest. The acreage in oats is kept small so that more time can be spent on the cotton crop.

A slight increase in acreage of wheat has been brought about by the establishment of a flour and feed mill in Decatur. The acreage of other small grains is insignificant.

Small grains are generally grown with a cover crop, such as vetch, Austrian peas, or crimson clover. The cover crop can be cut for hay after the small grain is harvested, used for temporary grazing, or plowed under as green manure.

In 1949, crimson clover, vetch, lespedeza, and other crops harvested for seed occupied 1,087 acres.

HAY AND FORAGE

The soil and climate of Morgan County are well suited to the growing of hay and forage crops. Since 1919 the trend has been toward in-

creased use of lime and phosphorus needed to grow more legume crops for hay. Legume hay crops have almost replaced the nonlegume hay crops.

Common lespedeza, an annual, will grow on practically all of the well-drained soils. Alfalfa, a perennial, was formerly grown only on the limestone lands. Now, by adding lime and plant nutrients, particularly boron, it can be grown satisfactorily on the sandstone lands.

Crimson clover is increasingly used to improve the soil. It is generally grazed from late in fall to early in spring, and the seed crop is harvested about the middle of May. In some places it is used as a green-manure crop. Rye, oats, Italian ryegrass, or wheat are often seeded with the clovers to increase the grazing value or to provide more green manure.

Sericea lespedeza, a perennial, is a promising hay crop. It grows on land not well suited to alfalfa and its management requirements are low. Experiments at two substations of the Alabama Agricultural Experiment Station, the Crossville substation in De Kalb County, and the Belle Mina substation in Limestone County, indicate that sericea lespedeza can be grown successfully on most of the acid soils, though it needs fertile land for best production.

Provided sericea is properly seeded and cared for, especially during the first 2 or 3 years, yields of 2 to 3 tons per acre can be expected annually. In addition to being a good hay crop, sericea can be used to hold the soil and to furnish temporary grazing.

PEANUTS

Until recently, peanuts were grown chiefly for home consumption. Peanuts will produce satisfactorily on most of the soils in Morgan County but when produced for market they are best grown on soils ranging from sandy loam to fine sandy loam. Peanuts are used also for grazing hogs. The vines make good hay.

OTHER CROPS

In 1950, the Federal census reported 273 acres of potatoes and 157 acres of sweetpotatoes in Morgan County. On most farms they are grown in small patches for home use. The surplus is sold locally.

Only a few truck farms are located in the county. Nearly every farmer has a small garden in which vegetables are grown for home use. Any excess is sold locally. Cabbage, beans, tomatoes, turnips, peas, beets, carrots, lettuce, spinach, okra, mustard greens, radishes, cucumbers, watermelons, and cantaloups are commonly grown.

Strawberries are an important crop on a few farms, but the acreage for commercial production is small. They are usually sold locally. They furnish income when other cash income is low.

Sorghum for sirup is grown on many farms. About 4,681 gallons of sirup were produced in 1949, most of which was consumed at home. There were 5 commercial fruit orchards and nut farms in the county in 1950. Apple, peach, plum, cherry, apricot, pear, and pecan trees are found in home orchards, and grapes do well in this county.

PLANTING DATES

The planting dates for general farm crops have not changed much in the past three decades. For the best results, cotton should be planted

between April 15 and May 15. Peanuts are planted about the same time as cotton. Corn is normally planted during the last two weeks in April so that it will be in the tassel stage during the July rains.

Small grains are sown during September and the first part of October. Some small grains, generally oats, barley, and rye, are seeded early in spring, but yields are often low.

Winter cover crops such as vetch and Austrian peas are sown in the latter part of August or not later than the middle of October. Crimson clover is seeded from July 15 to August 15 on a well-fallowed seedbed, or about one month later if planted on a firm or unfallowed seedbed. The annual lespedezas are generally sown during February or the early part of March.

Potatoes are planted from the first of February to the middle of March for the spring crop, and about the first of August for the fall crop.

ROTATIONS AND FERTILIZERS

The majority of the Morgan County farmers do not follow any definite system of crop rotation. The rotation most used is cotton followed by small grains and summer hay. The hay is usually annual lespedeza or soybeans.

The quantity of commercial fertilizer applied per acre is being increased rapidly. The farmers on the mountain plateaus have increased their applications more in recent years than farmers in any other section of the county. Experimental data and fertilizer demonstration tests have shown that fertilizer applications are economical, especially on the sandy soils. Probably more than 90 percent of the fertilizer now used is factory-mixed, and practically all of it is purchased by individuals, not by cooperatives. Cotton is the most highly fertilized general farm crop (*1*).

PERMANENT PASTURE

The acreage in permanent pasture is increasing rapidly. In 1949, 61,302 acres of the land in farms was pastured. The permanent pastures are generally on the bottoms and depressional areas where moisture is available for long periods. Farmers have not yet learned to grow good pastures on the sandy mountain soils. The permanent pastures are generally fertilized and seeded according to recommendations of the Alabama Experiment Station (*2*).

LIVESTOCK AND LIVESTOCK PRODUCTS

Dairying and beef cattle raising, or a combination of both, are important enterprises on several farms in the valleys. Dairy cattle are the more numerous; they are generally grades of the Jersey breed, though a small percentage are grade Guernseys or Holstein-Friesians. Although most of the dairy products are consumed at home, about 602,870 gallons of whole milk was marketed in 1949. Most of this milk was sold to the Decatur cheese plant. The main beef cattle breeds are Hereford, Aberdeen Angus, and Shorthorn. A few purebred cattle in the county are used mainly for breeding purposes.

Most of the hogs are grade or purebred Duroc-Jersey, Ohio Improved Chester (O. I. C.), Poland China, or Chester White. In recent years probably 25 to 30 percent of the hogs have been marketed and the

others consumed at home. Most of the hogs sold are trucked by stock dealers to Birmingham and Nashville. Some, however, are sold directly to a packing house in Decatur. The few goats in the county include some of the milk breeds.

Nearly every farm has a poultry flock. Most of the poultry and poultry products are used in the home; the surplus is sold locally or to poultry dealers who buy at the farm. Small numbers of turkeys, ducks, and geese are raised. In 1950, 110 farms in the county were listed as poultry farms.

The increased number of farm tractors in 1950 probably accounted for the decrease in the number of work stock. Some work animals are raised in the county, but most of the replacements come from Tennessee, Kentucky, and Missouri.

Most of the feed for livestock is grown on the farm. Probably not more than 10 to 15 percent of the feed used in recent years was purchased. Most of the poultry feed and some dairy feed are purchased.

Recent trends in the number of livestock on farms are indicated in table 3.

TABLE 3.—*Livestock on farms in Morgan County, Ala., for stated years*

[Livestock of all ages unless otherwise indicated by footnote]

Livestock	1930	1940	1950
	Number	*Number*	*Number*
Horses and colts	[1] 1, 447	[1] 1, 664	1, 342
Mules and mule colts	[1] 7, 741	[1] 5, 973	4, 132
Cattle and calves	[1] 7, 635	[1] 10, 183	13, 069
Sheep and lambs	[2] 100	[2] 236	84
Swine	[1] 5, 091	[3] 8, 889	[3] 8, 567
Chickens	[1] 115, 581	[3] 133, 191	[3] 169, 358
Other poultry	[4] 1, 868	[5] 1, 844	[6] 1, 614
Beehives	1, 746	1, 172	[7] 1, 457

[1] Over 3 months old.
[2] Over 6 months old.
[3] Over 4 months old.
[4] Turkeys, ducks, and geese raised in 1929.
[5] Turkeys, ducks, geese, and guineas raised.
[6] Turkeys and ducks raised in 1949.
[7] In 1949.

SIZE AND USE OF FARMS

Of the 4,682 farms reported in 1950, about 3,850 are under 100 acres in size. The average size was 67.6 acres. Land in farms made up 86.1 percent of the land in the county. Only 9 farms had more than 1,000 acres, which represented an increase in large farms and a decrease in small farms. There were 2,990 commercial farms.

Many of the small farms are located on the mountain plateaus. The livestock farms are in the valley sections, and the truck and dairy farms are near Eva, Decatur, and Hartselle.

Nearly 3,900 farms reported harvesting cotton in 1949; 3,677 raised corn for all purposes, of which 2,693 were classed as commercial farms; 4,269 reported cropland; and 2,822 reported woodland.

The acreage in hay and forage crops has increased at the expense of small grains. Many of the stony, eroded lands have been reforested or allowed to revert to native growth.

More than half of the farms were operated by owners or part owners. Only three had managers. Most of the rental agreements were verbal. The prevailing systems of farm rental are based on the labor involved and the amount of equipment, fertilizer, and seed furnished by the tenant or owner.

TYPE, SIZE, AND TENURE OF FARMS

The development of agriculture, as indicated by the size and condition of farms from 1930 to 1950, is shown in table 4.

TABLE 4.—*Type, size, and tenure of farms in Morgan County, Ala., for stated years*

Year	Total farms	Operated by —			Total area	Average per farm
		Owners	Tenants	Managers		
	Number	*Number*	*Number*	*Number*	*Acres*	*Acres*
1930	5, 079	1, 794	3, 285	0	279, 771	55. 1
1940	3, 990	1, 820	2, 168	2	305, 088	76. 5
1950	4, 682	2, 836	1, 843	3	316, 329	67. 6

FARM IMPROVEMENTS

The number of farm tractors increased from 347 in 1939 to 1,759 in 1950. Tractor equipment, together with improved horse-drawn farm machinery, is partly responsible for better land preparation and easier planting, tillage, and harvesting of the crops. In major part the small grains, vetch, crimson clover, and other seeds are harvested by power combines. Improved machinery and labor-saving methods of harvesting seed have enabled the farmers to increase the acreage of winter cover crops and to produce these crops at less cost.

In recent years farmers have been growing more feed and providing better pastures for their livestock. Since 1929 the amount of fertilizer purchased has decreased as the acreage in cotton has decreased, but the expenditure for farm labor has reached an alltime high.

Machinery and equipment commonly used varies from the one-horse plow to four-row tractor planters and cultivators. The ordinary farm is equipped with turning plows, disk- and spike-tooth harrows, one- or two-row cultivators, and mowing machines and hayrakes.

SOIL SURVEY METHODS AND DEFINITIONS

The scientist who makes a soil survey examines the soils in the field, classifies them in accordance with facts that he observes, and maps their boundaries on a topographic map or an aerial photograph (*6*).

Field study.—The soil surveyor bores or digs many holes to see what the soils are like. Each boring or hole usually reveals several distinct layers, called horizons, which collectively are known as the soil profile. Each layer is studied to see how it differs from the other layers in the profile and to learn the things about the soil that affect plant growth.

Color is usually related to the presence of organic matter. The darker the topmost layer, the more organic matter it contains. Streaks and spots of gray, yellow, and brown in lower layers generally indicate poor drainage and poor aeration.

Texture, or the content of sand, silt, and clay in each layer, is determined by the way soil feels when rubbed between the fingers. It is often checked later in the laboratory. Texture affects the availability of moisture to plants, determines whether plant nutrients or fertilizers will be leached out, and indicates whether the soil will be easy or difficult to cultivate.

Structure refers to the way the soil granulates and the number of pores or open spaces between particles. It indicates how easily plant roots and water can penetrate the soil.

Consistence, or the tendency of the soil to crumble or to stick together, indicates how difficult or easy it is to keep the soil open and porous under cultivation.

Other characteristics observed in making a soil survey are the kind of rock and the parent material from which the soil has developed, the depth to bedrock or to compact layers, the presence of gravel or stones that will interfere with cultivation, the steepness and kind of slope, the degree of erosion, and the acidity of the soil as measured by chemical tests.

Soil classification.—The soils are classified according to their internal and external characteristics as observed by the survey team or determined by laboratory analyses. They are classified into phases, types, and series. The soil type is the basic classification unit. A soil type may consist of several phases. Types that resemble each other in most of their characteristics are grouped into soil series.

Soil series.—Two or more kinds of soil (soil types) that differ in surface texture, but are otherwise similar in kind, thickness, and arrangement of soil layers, are normally designated as a soil series. In a given area, however, it frequently happens that a soil series is represented by only one soil type. Each soil series is named for a place near which it was first mapped.

Soil type.—Soils that are much alike in kind, thickness, and arrangement of their layers are classified as one soil type.

Soil phase.—Some soil types are separated into two or more phases because of differences other than those of kind, thickness, and arrangement of layers. The slope of a soil, the frequency of outcropping bedrock, the degree of erosion, or natural drainage are characteristics that suggest dividing a soil type into phases.

The soil phase (or the soil type if it has not been subdivided) is the unit shown on the soil map. It is the unit that has the narrowest range of characteristics. For this reason, land use and soil management

practices can be more definitely specified for it than for broader groups of soils that contain more variation.

Soil complex.—In some places, two or more soils are in such a mixed pattern that they cannot be feasibly separated on a small-scale map. Such areas are mapped as complexes.

Miscellaneous land types.—Rough, stony hillsides or deeply gullied land that have little true soil are not classified into series and types, but are given descriptive names, such as Rough gullied land (Decatur and Cumberland soil materials).

Erosion classification.—The erosion classification followed in defining, naming, and mapping eroded phases in Morgan County is as follows:

Soils eroded to the extent that subsoil material is within plow depth over half or more of the delineated area are classified and mapped as *eroded.* Ordinary tillage of this land will bring parts of the upper subsoil to the surface and alter the character of the original, or A horizon, by mixing the subsoil material with it. There may be a limited number of shallow, short gullies. It is probable that 50 to 75 percent of the original A horizon has been lost from these eroded soils.

Soils eroded to the extent that practically all of the original surface soil (A horizon) has been lost are classified as *severely eroded.* In places some of the subsoil may have been lost. Tillage of severely eroded areas is almost entirely in subsoil material. In general small short gullies are common, a few of which are too deep to be obliterated by tillage.

Areas eroded to an extent that the individual owner cannot economically afford to reclaim them except through very slow processes are classified and mapped as Rough gullied land (Decatur and Cumberland soil materials). These areas consist of an intricate pattern of gullies; the soil profile over most of the areas has been largely mutilated.

Slope ranges.—In this county slope ranges are defined differently for similar phases of different soils. For Hartsells, Tilsit, Enders, Crossville, Hanceville, Muskingum, Linker, Hector, and Pottsville soils, the limits for the slope phases are as follows: Level phase, 0 to 2 percent slopes; undulating phase, 2 to 5 percent slopes; rolling phase, 5 to 10 percent slopes; hilly phase, 10 to 20 percent slopes; and steep phase, more than 20 percent slopes. For the other soils of the county the limits are: Level phase, 0 to 2 percent slopes; undulating phase, 2 to 6 percent slopes; rolling phase, 6 to 12 percent slopes; hilly phase, 12 to 20 percent slopes; and steep phase, more than 20 percent slopes.

SOIL SERIES AND THEIR RELATIONS

In order to make use of the soil survey, it is necessary to know the soils and to understand their relationships. These relationships can be seen more easily if the soils are placed in groups according to their position in the landscape.

The soils of Morgan County are placed in four groups: (1) Soils of the uplands, (2) soils of the colluvial slopes, (3) soils of stream terraces, and (4) soils of first bottoms. The soil series of the county are described in the following pages. Soil series of the uplands are first discussed, and those of the other three physiographic groups follow in the order named.

SOILS OF THE UPLANDS

The soil series of the uplands have developed from several kinds of parent materials. The series are discussed by groups, according to the source of their parent materials.

Limestone materials.—The Decatur, Dewey, Talbott, and Colbert are the soils of the uplands that have developed from residuum weathered from limestone.

The Talbott and Colbert soils are distinguished by their tough, plastic, and rather slowly pervious subsoil. In both series, the surface layer is in some places influenced by materials from sandstone. The Colbert soils are more sticky and plastic than the Talbott, and their subsoil is more yellowish. In general, soils of both series are practically chert-free, though some small isolated areas contain a moderate amount.

The Decatur soils have a reddish-brown to brown surface soil and a reddish-brown to strong reddish-brown subsoil. The Dewey soils have a brown, reddish-brown, or grayish-brown surface soil and a strong-brown to reddish-brown subsoil. Chert fragments seldom occur in the Decatur soils, but moderate amounts occur in the Dewey soils.

Of the four soil series in this group, the Decatur are probably the most fertile. The Dewey, Talbott, and Colbert follow, in order of decreasing fertility. Dewey soils have the most permeable subsoil, and the Decatur, Talbott, and Colbert have progressively less permeable subsoil.

Acid sandstone and shale materials.—The Hartsells, Linker, Hanceville, Crossville, Enders, Tilsit, and Johnsburg soils have developed from materials weathered from acid sandstone and shale. The parent materials of the Hartsells, Linker, Hanceville, and Crossville soils contain more sandstone material and less shale than those of the Enders, Tilsit, and Johnsburg series.

The surface soil of the Hartsells series is brownish gray to yellowish brown; that of the Linker, light brownish gray to light yellowish brown; and that of the Hanceville, grayish brown, yellowish brown, or reddish brown. The subsoil of the Hartsells series is light yellowish brown; that of the Linker, light brown to moderate reddish brown; and that of the Hanceville, weak to moderate reddish brown.

Crossville soil is distinguished by its brownish-gray surface soil, reddish-brown subsoil, and shallow depth to bedrock. The bedrock most often occurs at depths of 18 to 3 0inches. The Enders and Tilsit soils have brownish-gray surface soil, and that of the Johnsburg is brownish gray to weak yellow. The Enders series has a brown to yellowish-brown subsoil; the Tilsit, a yellowish-brown subsoil; and the

Johnsburg, a mottled gray and pale-yellow subsoil. The Tilsit subsoil has a partly indurated hardpan at depths of 18 to 30 inches.

The seven soil series developed on material weathered from acid sandstone and shale are low in natural fertility but very responsive to good management. The Hartsells, Linker, Hanceville, Enders, and Tilsit soils are more productive than the Crossville and Johnsburg, and they are better suited to agriculture. The soils of the Hanceville series are probably the most productive, and the Crossville and Johnsburg are the least productive.

Interbedded sandstone and limestone materials, with small amounts of shale.—Soils of the Christian and Pearman series have developed from materials weathered chiefly from interbedded sandstone and limestone. These parent materials include a small amount of shale residuum.

Christian soils have a brown to brownish-gray surface soil and a reddish-brown subsoil. Pearman soils, in contrast, have a light brownish-gray to light yellowish-brown surface layer and a yellowish-brown subsoil. The Christian soils are somewhat more productive than the Pearman and probably are better suited to agriculture.

Materials weathered from acid sandstone and interbedded acid sandstone and shale.—These are parent materials for soils of the Hector, Pottsville, and Muskingum series. All these soils are shallow to bedrock and low in fertility. They are on hilly to steep slopes. The Muskingum soils are brownish or yellowish; the Hector, reddish; and the Pottsville, brownish gray to yellowish brown.

SOILS OF THE COLLUVIAL SLOPES

The soils derived from colluvium and local alluvium occupy about a tenth of the county. They lie in sinks or depressions, at the foot of slopes, and along gentle draws. They have developed from material moved from adjacent high-lying soils. Soils of the Abernathy, Ooltewah, Guthrie, Barbourville, Cotaco, and Lickdale series are in the depressions (sinks) or gentle draws, and the Allen and Jefferson are on foot slopes.

Materials from high-grade limestone.—The Abernathy, Hollywood, Ooltewah, and Guthrie soils have formed in material derived mainly from soils underlain by high-grade limestone. The Abernathy soils are well drained, very young, fertile, brown to reddish brown, and friable to depths of 30 inches or more. They are productive of most crops and are easy to work and to conserve.

The Hollywood soils are dark colored and have a heavy, tough clay subsoil. They are neutral to alkaline, medium in productivity, and favorable in moisture conditions. Depth to bedrock ranges from very shallow to deep.

The Ooltewah and Guthrie soils were derived from materials washed mainly from less fertile soils than those from which the Abernathy materials were derived. Consequently, these soils are less fertile than the Abernathy. The Guthrie soil is poorly drained, and the Ooltewah soils are imperfectly drained. The productivity of these two series, and the use to which they are put, depends largely on their internal

drainage. They are easy to work and to conserve, and where better drained, are very productive. The Guthrie soil is least productive of this group and is suited to the smallest number of crops.

Materials from acid sandstone and shale.—Soils developed from these materials—the Allen, Jefferson, Barbourville, Cotaco, and Lickdale—differ mainly in physiography and drainage.

The Allen and Jefferson soils, older than others of the group, occupy stronger slopes and require more conservation practices. Slopes of the Allen soils range from undulating to hilly, and those for the Jefferson, from undulating to rolling. Allen soils have a brownish-gray surface soil and a reddish-brown subsoil. The Jefferson soils have a brownish-gray surface soil and a light yellowish-brown subsoil. Soils of both series are well drained and easy to till but low in natural fertility. They respond to good management and are suited to a wide variety of crops.

In position and drainage, the Barbourville, Cotaco, and Lickdale soils are similar to the Abernathy, Ooltewah, and Guthrie. They differ in source of parent material.

Barbourville soil is well drained; the Cotaco, imperfectly drained; and the Lickdale, poorly drained. Internal drainage chiefly determines the agricultural suitability of these soils. The Barbourville soil is suited to the widest range of crops, the Cotaco is next, and the Lickdale is last. The Lickdale soil is limited mainly to pasture and hay crops. Soils of all three series are low in natural fertility, but they respond very well to good management and are easy to till and conserve.

SOILS OF STREAM TERRACES

The soils of the stream terraces are members of the Cumberland, Etowah, Captina, Capshaw, Wolftever, Tupelo, Taft, Robertsville, Waynesboro, Nolichucky, Sequatchie, Holston, Monongahela, and Tyler series. The soils have been derived from two main kinds of parent materials—limestone, and mixed sandstone and shale.

The soils lie on stream terraces adjacent to the present flood plains or first bottoms. The typical relief is nearly level to sloping, but many of the soils on the old terraces have undulating or rolling relief because the terraces on which they occur have been somewhat dissected by recent stream action.

Soils of the stream terraces are, in general, well drained. They range from low to high in fertility but all respond to good management. Some contain waterworn gravel. In general, the soils dominantly of limestone origin are higher in natural fertility than those from sandstone and shale.

Materials from mixed limestone rocks.—In this group are soils of the Cumberland, Etowah, Capshaw, Wolftever, Tupelo, Taft, and Robertsville series. All were derived from the same kind of material, but they differ in drainage. Cumberland soils have the best drainage, and the others have progressively less desirable drainage in the order in which they are listed above.

Cumberland soils have well-developed profiles and a reddish-brown to yellowish-brown subsoil. Etowah soils have a less mature profile than the Cumberland, and their subsoil is yellowish brown to brown.

The Capshaw soils are yellow to light brownish gray and show rust-brown mottlings in the lower subsoil. Wolftever soil has a compact yellowish-brown subsoil. The Tupelo soils are brownish gray to yellowish gray, with mottled gray, pale yellow, and rust brown in the subsoil. The Taft soil has a brownish-gray to yellowish-brown imperfectly drained profile. The Robertsville soil has a brownish-gray to light-gray poorly drained profile.

Materials mainly from mixed sandstone and shale.—In order of decreasing drainage, the soils of this group are the Waynesboro, Nolichucky, Sequatchie, Holston, Monongahela, and Tyler. The first four named generally occur on high terraces and have rather well-defined layers. The last two—Monongahela and Tyler—are on low terraces.

Waynesboro soils have a grayish-brown to yellowish-brown or reddish-brown surface soil and a brown to reddish-brown subsoil. The Nolichucky soils have medium-gray to yellowish-gray surface soil and a reddish-brown subsoil. The Sequatchie soil has a brown to yellowish-brown surface soil and a subsoil of much the same color. The Holston soils have a brownish-gray to yellowish-gray surface soil and a yellow to yellowish-brown subsoil.

The Monongahela soil is imperfectly drained; it has a brownish-gray to yellowish-gray surface soil and a yellowish-brown subsoil mottled with gray, rust brown, and pale yellow. The Tyler soil is poorly drained. Its surface soil is gray to whitish gray, and the subsoil is light gray mottled with yellow and brown.

SOILS OF FIRST BOTTOMS

The soils of the first bottoms are members of the Huntington, Egam, Lindside, Melvin, Dunning, Pope, Bruno, Philo, and Atkins series. They occur on nearly level areas along streams and are subject to flooding. The main areas are along the Tennessee River, Cotaco, and Flint Creeks, and their tributaries. The material giving rise to these soils has been transported and deposited by streams. The character of the soils depends largely upon the nature of the soil or soil materials from which the alluvium washed and on the rate at which the water was moving when the alluvium was deposited. According to source of parent material, the soil series can be divided into two classes.

Material mainly from sandstone and shale.—The soils forming in alluvium washed mainly from sandstone and shale rocks are the Pope, Bruno, Philo, and Atkins.

Materials mainly from limestone.—Soils forming in alluvium washed mainly from limestone rocks are members of the Huntington, Egam, Lindside, Melvin, and Dunning series.

SOIL TYPES AND PHASES

In the following pages, the soils of Morgan County are described and their relation to agriculture is discussed. The acreage and proportionate extent of each are listed in table 5; their management requirements are given in the section, Use and Management of Morgan County Soils; and their location and distribution are shown on the accompanying map.

TABLE 5.—*Approximate acreage and proportionate extent of soils mapped in Morgan County, Alabama*

Soil	Area	Proportionate extent
	Acres	*Percent*
Abernathy fine sandy loam	2, 983	0. 8
Abernathy silt loam	5, 125	1. 3
Allen fine sandy loam, eroded hilly phase	874	. 2
Allen fine sandy loam, eroded rolling phase	4, 175	1. 1
Allen fine sandy loam, eroded undulating phase	3, 797	1. 0
Allen fine sandy loam, hilly phase	530	. 1
Allen fine sandy loam, rolling phase	586	. 2
Allen fine sandy loam, severely eroded hilly phase	708	. 2
Allen fine sandy loam, severely eroded rolling phase	1, 280	. 3
Allen fine sandy loam, undulating phase	475	. 1
Allen stony fine sandy loam, eroded rolling phase	246	. 1
Allen stony fine sandy loam, hilly phase	859	. 2
Atkins silt loam	6, 117	1. 6
Barbourville fine sandy loam	1, 508	. 4
Bruno loamy fine sand	723	. 2
Captina and Capshaw loams, undifferentiated	1, 695	. 4
Captina and Capshaw silt loams, undifferentiated	2, 713	. 7
Christian clay loam, severely eroded rolling phase	526	. 1
Christian loam, eroded rolling phase	1, 447	. 4
Christian loam, eroded undulating phase	2, 628	. 7
Christian loam, undulating phase	521	. 1
Cobbly colluvium (Jefferson soil material)	245	. 1
Colbert cherty silt loam, rolling phase	502	. 1
Colbert loam, eroded rolling phase	1, 133	. 3
Colbert loam, eroded undulating phase	1, 977	. 5
Colbert loam, hilly phase	626	. 2
Colbert loam, rolling phase	848	. 2
Colbert loam, undulating phase	976	. 2
Colbert silt loam, level phase	1, 171	. 3
Colbert silt loam, undulating phase	2, 050	. 5
Colbert silty clay loam, eroded rolling phase	1, 021	. 3
Colbert silty clay loam, eroded undulating phase	2, 774	. 7
Cotaco loam	2, 983	. 8
Crossville loam, undulating phase	154	(1)
Cumberland silt loam, level phase	308	. 1
Cumberland silt loam, undulating phase	799	. 2
Cumberland silty clay loam, eroded undulating phase	3, 717	1. 0
Cumberland silty clay loam, severely eroded rolling phase	687	. 2
Decatur silt loam, undulating phase	606	. 2
Decatur silty clay loam, eroded undulating phase	2, 947	. 8
Decatur silty clay loam, severely eroded rolling phase	422	. 1
Dewey cherty silt loam, undulating phase	864	. 2
Dewey cherty silty clay loam, eroded rolling phase	173	(1)
Dewey cherty silty clay loam, eroded undulating phase	217	. 1
Dewey silt loam, undulating phase	1, 146	. 3
Dewey silty clay loam, eroded hilly phase	16	(1)
Dewey silty clay loam, eroded rolling phase	271	. 1
Dewey silty clay loam, eroded undulating phase	1, 473	. 4
Dunning silty clay	3, 747	1. 0
Egam silty clay loam	2, 417	. 6
Enders loam, eroded rolling phase	8, 267	2. 2
Enders loam, eroded undulating phase	2, 084	. 5
Enders loam, rolling phase	3, 127	. 8
Enders loam, undulating phase	1, 319	. 3
Etowah loam, level phase	736	. 2
Etowah loam, undulating phase	1, 723	. 4
Etowah silty clay loam, eroded undulating phase	560	. 1

[1] Less than 0.1 percent.

TABLE 5.—*Approximate acreage and proportionate extent of soils mapped in Morgan County, Alabama*—Continued

Soil	Area	Proportionate extent
	Acres	*Percent*
Guthrie silt loam	536	0. 1
Hanceville fine sandy loam, eroded rolling phase	1, 179	. 3
Hanceville fine sandy loam, eroded undulating phase	1, 244	. 3
Hanceville fine sandy loam, undulating phase	389	. 1
Hanceville loam, severely eroded rolling phase	793	. 2
Hartsells fine sandy loam, eroded rolling phase	6, 358	1. 7
Hartsells fine sandy loam, eroded rolling shallow phase	603	. 2
Hartsells fine sandy loam, eroded undulating phase	3, 764	1. 0
Hartsells fine sandy loam, rolling phase	3, 351	. 9
Hartsells fine sandy loam, rolling shallow phase	609	. 2
Hartsells fine sandy loam, undulating phase	5, 116	1. 3
Hartsells fine sandy loam, undulating shallow phase	469	. 1
Hartsells loam, undulating phase	277	. 1
Hector fine sandy loam, eroded hilly phase	2, 211	. 6
Hector fine sandy loam, hilly phase	588	. 2
Hector fine sandy loam, severely eroded hilly phase	1, 327	. 3
Hector stony fine sandy loam, eroded hilly phase	642	. 2
Hector stony fine sandy loam, hilly phase	746	. 2
Hector stony fine sandy loam, steep phase	816	. 2
Hollywood loam	249	. 1
Hollywood silty clay	8, 618	2. 3
Holston fine sandy loam, eroded undulating phase	643	. 2
Holston fine sandy loam, level phase	3, 336	. 9
Holston fine sandy loam, undulating phase	4, 965	1. 3
Holston gravelly fine sandy loam, eroded rolling phase	497	. 1
Holston gravelly fine sandy loam, eroded undulating phase	347	. 1
Holston gravelly fine sandy loam, rolling phase	339	. 1
Holston gravelly fine sandy loam, undulating phase	312	. 1
Huntington fine sandy loam, sanded phase	540	. 1
Huntington silt loam	1, 055	. 3
Jefferson fine sandy loam, eroded rolling phase	1. 100	. 3
Jefferson fine sandy loam, eroded undulating phase	2, 140	. 6
Jefferson fine sandy loam, rolling phase	326	. 1
Jefferson fine sandy loam, undulating phase	1, 003	. 3
Johnsburg loam	778	. 2
Lickdale silt loam	1, 745	. 4
Limestone rockland, rolling	2, 190	. 6
Limestone rockland, rough	22, 464	5. 9
Lindside silty clay loam	5, 849	1. 5
Linker fine sandy loam, eroded hilly phase	344	. 1
Linker fine sandy loam, eroded rolling phase	7, 975	2. 1
Linker fine sandy loam, eroded undulating phase	4, 789	1. 2
Linker fine sandy loam, rolling phase	1, 528	. 4
Linker fine sandy loam, undulating phase	2, 303	. 6
Linker loam, severely eroded rolling phase	1, 885	. 5
Melvin silt loam	6, 956	1. 8
Monongahela fine sandy loam	3, 478	. 9
Muskingum fine sandy loam, eroded hilly phase	1, 873	. 5
Muskingum fine sandy loam, hilly phase	2, 795	. 7
Muskingum stony fine sandy loam, eroded hilly phase	1, 079	. 3
Muskingum stony fine sandy loam, hilly phase	5, 576	1. 5
Muskingum stony fine sandy loam, rolling phase	1, 936	. 5
Muskingum stony fine sandy loam, steep phase	14, 698	3. 9
Nolichucky fine sandy loam, eroded undulating phase	117	[1]
Nolichucky fine sandy loam, undulating phase	129	[1]
Nolichucky gravelly fine sandy loam, eroded rolling phase	822	. 2
Nolichucky gravelly fine sandy loam, eroded undulating phase	250	. 1

[1] Less than 0.1 percent.

TABLE 5.—*Approximate acreage and proportionate extent of soils mapped in Morgan County, Alabama*—Continued

Soil	Area	Proportionate extent
	Acres	*Percent*
Nolichucky gravelly fine sandy loam, hilly phase	480	0. 1
Nolichucky gravelly fine sandy loam, rolling phase	523	. 1
Ooltewah fine sandy loam	1, 893	. 5
Ooltewah silt loam	6, 874	1. 8
Pearman loam, eroded rolling phase	1, 379	. 4
Pearman loam, eroded undulating phase	2, 391	. 6
Pearman loam, undulating phase	2, 051	. 5
Pearman silty clay loam, severely eroded rolling phase	457	. 1
Philo fine sandy loam	1, 485	. 4
Philo-Lindside soils, undifferentiated	5, 461	1. 4
Pope fine sandy loam	664	. 2
Pottsville shaly silt loam, eroded hilly phase	2, 705	. 7
Pottsville shaly silt loam, hilly phase	4, 030	1. 0
Pottsville shaly silt loam, severely eroded hilly phase	467	. 1
Pottsville shaly silt loam, steep phase	5, 870	1. 5
Robertsville silt loam	5, 416	1. 4
Rough gullied land (Decatur and Cumberland soil materials)	441	. 1
Rough gullied land (Linker and Hartsells soil materials)	1, 079	. 3
Sequatchie fine sandy loam	2, 541	. 7
Sequatchie fine sandy loam, eroded phase	1, 682	. 4
Stony rolling land (Talbott and Colbert soil materials)	3, 458	. 9
Stony rough land (Muskingum soil material)	7, 547	2. 0
Stony smooth land (Talbott and Colbert soil materials)	1, 458	. 4
Taft silt loam	1, 097	. 3
Talbott cherty silty clay loam, eroded hilly phase	200	. 1
Talbott cherty silty clay loam, eroded rolling phase	323	. 1
Talbott loam, eroded rolling phase	1, 229	. 3
Talbott loam, eroded undulating phase	1, 457	. 4
Talbott silt loam, undulating phase	2, 176	. 6
Talbott silty clay loam, eroded hilly phase	514	. 1
Talbott silty clay loam, eroded rolling phase	857	. 2
Talbott silty clay loam, eroded undulating phase	3, 964	1. 0
Talbott silty clay loam, severely eroded rolling phase	689	. 2
Tilsit clay loam, severely eroded rolling phase	213	. 1
Tilsit silt loam, eroded rolling phase	5, 217	1. 4
Tilsit silt loam, eroded undulating phase	12, 024	3. 2
Tilsit silt loam, level phase	1, 384	. 4
Tilsit silt loam, rolling phase	1, 185	. 3
Tilsit silt loam, undulating phase	9, 685	2. 5
Tupelo loam	1, 848	. 5
Tupelo silt loam	6, 239	1. 6
Tyler fine sandy loam	1, 346	. 4
Tyler silt loam	4, 118	1. 1
Waynesboro fine sandy loam, eroded rolling phase	829	. 2
Waynesboro fine sandy loam, eroded undulating phase	6, 910	1. 8
Waynesboro fine sandy loam, severely eroded rolling phase	1, 302	. 3
Waynesboro fine sandy loam, undulating phase	821	. 2
Wolftever silt loam	1, 149	. 3
Mines and pits	19	[1]
Made land	104	. 3
Water	11, 260	3. 0
Total	380, 160	[2] 99. 7

[1] Less than 0.1 percent.

[2] Does not total 100 percent because areas of less than 0.1 percent are not included.

Abernathy silt loam (0 to 2 percent slopes) (Ab).—This soil occupies well-drained depressional areas, or sinks, and nearly level toe slopes; it has developed from material washed from high-grade limestone. Although the external drainage is slow to very slow, the internal drainage, which finds outlets in crevices in the underlying limestone bedrock, is rapid enough to make it a good soil for crops. The original cover was probably moisture-loving deciduous trees.

Although this soil is not very extensive, it is excellent for crop production. Most of the areas are small and scattered widely throughout the Decatur-Waynesboro-Cumberland-Etowah and the Decatur-Talbott-Dewey-Robertsville soil associations.

Profile description:

0 to 16 inches, brown or weak reddish-brown mellow silt loam; relatively high in organic matter.
16 to 28 inches, moderate-brown to dark-brown friable silt loam or silty clay loam; high in organic matter.
28 inches +, moderate yellowish-brown silty clay loam mottled with gray, yellow, and brown; low to very low in organic matter.

The material throughout the entire profile is very permeable and medium acid in reaction. It has a rather high water-holding capacity. The areas of Abernathy soil in the Decatur-Waynesboro-Cumberland-Etowah soil association have a little coarser texture than those in the Decatur-Talbott-Dewey-Robertsville association.

Use and management.—This is one of the best soils for agricultural use in the county. Practically all of it has been cleared and is now used extensively for such crops as are grown on surrounding soils. It is highly productive, easily worked, presents no serious erosion problems, and, under proper management, is suited to intensive use. Because of its permeability and position in well-drained areas, moisture relations are particularly favorable for plant growth. During extended wet periods, however, small grains may lodge and alfalfa may be severely damaged.

In spite of rather rank weed growth, cotton does fairly well on this soil. It opens a little later than on higher lands, and occasional frosts may prevent full development of the bolls. Corn grows so rank at times that some lodging may occur.

This soil is naturally very fertile, and plant nutrients are partially replenished by wash and seepage from surrounding soils. Its productivity is easily maintained. It has no rigid requirements in regard to crop rotation and soil amendments, and little fertilizer is used.

Abernathy fine sandy loam (0 to 2 percent slopes) (Aa).—Except for a larger amount of fine sand in the profile, this soil is very much the same as Abernathy silt loam. It occurs in similar positions, mainly on depressional areas within Waynesboro fine sandy loam soils or in the Decatur-Waynesboro-Cumberland-Etowah association. Some areas are being damaged by a rather rapid inwash of sand or, in other places, by subsoil material washed from adjoining severely eroded areas. Erosion, however, is being checked to some extent by the control programs carried on in the county. Moisture relations are particularly favorable for plant growth, but during extended wet periods some crops may be seriously damaged.

Use and management.—The main crops are cotton, corn, hay, and pasture, but the yields average 10 to 25 percent lower than those

produced on Abernathy silt loam under like treatment. Fertilization and management practices are similar on the two soils; and both have been cleared and used for agriculture since the early days of the county.

Allen fine sandy loam, undulating phase (2 to 6 percent slopes) (AL).—This soil has developed in colluvial positions at the base of slopes, principally at the base of mountains. It is underlain by sandstone and shale with some limestone. To a large extent, the material has washed or rolled down from higher slopes of such soils as the Hanceville, Hector, and Hartsells. Sandstone fragments are common in the subsoil and to a small extent on the surface. Both surface and internal drainage are moderate, and erosion is only moderately rapid.

This is not an extensive soil, but it is important because a wide variety of crops may be grown on it. Most areas are small and scattered throughout the Allen-Hollywood-Christian-Atkins soil association.

Profile description:

0 to 5 inches, brownish-gray loose fine sandy loam; contains considerable organic matter.
5 to 12 inches, light-brown friable fine sandy loam rather low in organic matter.
12 to 24 inches, pale reddish-brown friable fine sandy clay with well-formed irregular angular to subangular dark-red fragments; very definite cleavage lines.
24 to 38 inches, weak reddish-brown to pale reddish-brown friable fine sandy clay; contains numerous small angular fragments; slightly compact or firm in place, and a weak nutlike structure.
38 to 52 inches, weak reddish-brown friable fine sandy loam; slightly firm in place; contains many sandstone fragments ¼ to 2 inches in diameter; weak crumb structure.
52 to 60 inches, light-brown to moderate-brown fine sandy loam splotched with red, gray, and pale yellow; contains numerous sandstone fragments up to 3 inches in diameter.

Variation in profile development is noticeable, especially in depth to the red subsoil and thickness of the red layer. In places not much change occurs in the subsoil color in the upper 8 feet, but elsewhere the red color changes abruptly toward yellowish brown or brownish yellow at 60 inches or less. The material throughout the entire profile is very permeable and strongly to very strongly acid. It has only a medium to low content of organic matter. Small areas of Allen loamy fine sand are included.

Use and management.—Although this moderately productive soil occurs in rather small units, it is desirable for general farm crops. Much of it is cultivated to cotton, corn, small grains, hay, and pasture grasses. It is a good soil for gardens and home orchards. It should prove satisfactory for growing alfalfa if properly fertilized and limed, and good yields from truck crops and pastures may be expected under improved practices.

This soil can be tilled without injury under a wide range of moisture conditions. The few rock fragments on the surface and throughout the profile generally do not interfere with cultivation. Although this soil is susceptible to erosion, the surface layer can be conserved under good management.

Management requirements are moderately exacting. Lime, phosphorus, and potassium are needed, and nitrogen and organic matter should be maintained or increased. Some methods of conserving soil moisture and soil material are required on most areas.

Other good management practices are growing of winter cover crops, using a good crop rotation, and applying liberal amounts of a well-chosen commercial fertilizer.

Allen fine sandy loam, eroded undulating phase (2 to 6 percent slopes) (AE).—This soil is similar to Allen fine sandy loam, undulating phase, in topographic position and slope; it differs from that soil in color and to some degree in texture of the surface soil. These differences are caused by the loss of 50 percent or more of the original surface soil, and 75 percent or more in places. Much of the plow layer consists of subsoil material and is therefore more red in color and heavier in texture than that of the undulating phase.

This soil is the most extensive of the Allen soils in the county. All of it has been in cultivation but at present most of it is used every year for crops. This soil occurs on foot slopes and is in the Allen-Hollywood-Christian-Atkins association.

Use and management.—This soil has lost much of its workability and moisture-absorbing qualities. Danger from erosion has increased, but if this soil is protected by terracing, crop selection, contour tillage, and other soil-building practices, including incorporation of organic matter, it may become very desirable for general farm crops.

The soil has about the same agricultural uses as Allen fine sandy loam, undulating phase, but yields are usually from 10 to 25 percent lower. Crop rotations and fertilizer applications should be similar to those suggested for Allen fine sandy loam, undulating phase.

Allen fine sandy loam, rolling phase (6 to 12 percent slopes) (AG).—This soil is similar to Allen fine sandy loam, undulating phase, in color, texture, structure, and consistence, but it has a steeper slope. It differs also from the eroded undulating phase in slope, and in color and texture of the surface soil. It is associated with the Jefferson, Talbott, and other Allen soils. The areas are small and are scattered throughout the Allen-Hollywood-Christian-Atkins soil association on foot slopes in the limestone valleys.

Use and management.—About 90 percent of this soil is in forest; the rest has been cleared for only a few years and is used for general crops and pasture. It is suited to about the same crops as Allen fine sandy loam, undulating phase, and under good management practices yields are only about 5 to 10 percent less. It is best suited for close-growing crops and pasture. Planting on the contour, stripcropping, frequent rotation of crops, and terracing are good practices where clean-cultivated crops are to be grown. Corn and cotton are the dominant crops planted.

This soil is very susceptible to erosion, but it is workable and has good moisture-absorbing and moisture holding qualities.

Allen fine sandy loam, eroded rolling phase (6 to 12 percent slopes) (AD).—Among the Allen soils, this phase ranks second in acreage. It is similar to Allen fine sandy loam, rolling phase, in position, parent materials, and slope but has lost a greater amount of sur-

face soil through erosion. From 50 to 75 percent of the original surface soil has been washed away, and the average loss probably exceeds 65 percent. The soil resembles Waynesboro fine sandy loam, eroded rolling phase, in color, texture, and slope. The rock fragments in this soil, however, are usually more or less angular in shape—an indication of colluvial origin. In contrast, the fragments in the Waynesboro soil are more or less waterworn pebbles or small cobblestones, an indication of alluvial origin.

The plow layer of this soil is now composed of remnants of the original surface soil mixed with the subsurface soil and materials from the upper subsoil. The upper 4- to 8-inch layer is pale reddish-brown to brown friable heavy fine sandy loam to fine sandy clay loam. Practically no subsurface layer occurs between the surface layer and the subsoil in this eroded soil. The subsoil resembles that of the undulating phase.

Use and management.—The workability and moisture-absorbing qualities of this soil are not so good as those of Allen fine sandy loam, undulating phase. This soil has less organic matter in its surface layer. The slow moisture absorption and low moisture-holding qualities of the present surface and subsurface layers have increased the rate of runoff, especially during heavy showers and prolonged rain.

This soil has been cleared and is now used for crops or pasture. By using long crop rotations, growing winter legumes, and practicing other good management, the crop yields can be increased, particularly in the favorable locations. Cotton is the main crop; the secondary crops are corn, cowpeas, soybeans, small grains, lespedeza, and sorghum. The variations in degree of slope and amount of erosion cause wide differences in yields on individual areas.

Allen fine sandy loam, severely eroded rolling phase (6 to 12 percent slopes) (AK).—This phase differs from Allen fine sandy loam, rolling phase, in degree of erosion. Practically all of the original surface soil and subsurface soil have been removed. The present plow layer consists almost entirely of materials from the subsoil, and some of the subsoil has been removed by sheet and gully erosion.

The present surface soil is a red to reddish-brown friable fine sandy clay loam, 3 to 6 inches deep. The subsoil is a moderately firm but friable yellowish-red to brownish-red fine sandy clay that breaks readily into small angular or subangular fragments along well-developed cleavage lines. This subsoil, 36 to 60 inches thick, is generally not so deep as the Allen subsoil on gentler slopes. It becomes paler red or more yellow with depth.

The loss of surface materials, without removal of rock fragments, leaves a rocky surface layer. The rocks have been hauled off some of the fields.

This soil covers a large acreage. It is well distributed in foothills that border the valleys and coves. Most areas are small; only a few contain more than 25 acres.

Use and management.—All of this soil has been in cultivation, but most areas are now idle or in pasture. Probably 25 percent has reverted to forests. Only a small percentage is in cultivation or improved permanent pasture. The common practice is to allow the soil to lie fallow for a number of years, during which time it is used for

pasture. The volunteer plants and pasture grasses furnish very little grazing, although lespedeza reestablishes itself within a short time. Areas that have been in pasture for some time are occasionally plowed and cultivated for a year or two; they are usually planted to cotton or corn.

Average yields are relatively low. Satisfactory returns could be obtained from this soil by planting row crops for 1 or 2 years and following with 3 years or more of close-growing crops. Such crops as kudzu and sericea lespedeza are well suited to this soil; they would make satisfactory growth if properly planted and managed, supply some hay and grazing, and aid in erosion control.

Allen fine sandy loam, hilly phase (12 to 20 percent slopes) (AF).—This soil is similar to the other Allen soils but it has stronger slopes.

It normally occurs as small areas on strongly sloping foothills, but some areas contain 15 to 30 acres. Most of the larger areas are cut into smaller sections by deep cross drains, which produce a hilly topography instead of strong slopes. Areas are located south of Trinity and along the lower slopes of Little Mountain. The thickness of the surface and subsoil layers varies more than in the more gently sloping phases.

Use and management.—A small part of this soil was once cleared for pasture or cultivated. The cleared areas are now used for pasture or lie abandoned; some have reverted to forest. A few small areas are planted to row crops. The soil should be tilled for only 1 or 2 years in a 5- to 10-year period. Under present economic conditions, the best uses of this soil are permanent pasture and forest.

This soil is well suited to kudzu, which is probably the best forage for steep slopes or eroded soils. Kudzu can be established readily by following recommended planting practices. If brush and trees are removed, the vines will grow close to the ground. Periodic pasturing is suggested so that the kudzu may have a chance to reestablish good growth.

Allen fine sandy loam, eroded hilly phase (12 to 20 percent slopes) (AC).—This soil is similar to Allen fine sandy loam, hilly phase, in position and parent material but its surface soil has become more reddish brown in color after being mixed with a part of the subsurface layer. More than 50 percent of the original surface layer has been removed by erosion.

Use and management.—All of this soil was once planted to crops, but the major part is now idle, covered with second-growth forest, or in pasture. Some small areas are still used for crops. These areas remain idle for a few years, during which time they are included in pastures. Grasses and plants volunteer in these plots and lespedeza reestablishes itself in a relatively short time. Occasionally, an area that has been in pasture for only a year or two is plowed and placed in cultivation for at least 1 or 2 years.

Cotton, corn, and sorghum are the dominant crops. Average yields are low, although fair crops are produced the first year of cultivation. These cultivated areas should be planted to some permanent crop such as kudzu or they should be reforested.

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Allen fine sandy loam, severely eroded hilly phase (12 to 20 percent slopes) (AH).—This soil is similar to Allen fine sandy loam, eroded hilly phase, in position, slope, and distribution but it has lost more of its surface soil through erosion. The present surface layer consists mainly of materials from the upper subsoil, so its texture is a friable fine sandy clay loam. The admixture of red subsoil materials has changed the color of the surface layer to a reddish brown. Practically none of the original surface soil remains, and gully erosion has removed some of the subsoil materials.

Use and management.—All of this soil has been cleared for pasture or cropped, but nearly 50 percent has reverted to forest through natural reseeding. Some areas have been replanted to pine, black locust, or other suitable forest trees; the balance is used for pasture.

This badly eroded soil is best used for forest; its strong slope makes cultivation difficult and erosion control impractical. Kudzu, if properly planted and managed, would furnish some grazing and would aid in the control of erosion.

Allen stony fine sandy loam, eroded rolling phase (6 to 12 percent slopes) (AM).—This soil lies near the base of Sand Mountain in colluvial positions. It is closely associated with other Allen soils and with Jefferson and Muskingum soils. The profile is somewhat coarse in texture. Sandstone fragments occur on the surface and in the soil mass. Some areas with less than 4 percent slopes have been included.

Drainage is moderate to rapid on the surface, and a good supply of seepage moisture is generally available in the subsoil. Shortleaf and loblolly pines do well on this soil, if given an opportunity.

Use and management.—Crops do fairly well on this soil but stoniness makes tillage difficult. Yields do not justify the extra cost and effort necessary for cultivation. Nearly all of the soil is cleared. Good pastures can be developed by proper seeding and fertilization. The soil should be cultivated on the contour if row crops are planted; terraces would be desirable in some places.

Allen stony fine sandy loam, hilly phase (12 to 20 percent slopes) (AN).—Except for slope and erosion, this soil is similar to Allen stony fine sandy loam, eroded rolling phase. It is associated with Muskingum, Hector, and the other Allen soils. Surface drainage is moderate to rapid, and internal drainage is moderate. There is a good supply of seepage moisture.

Use and management.—About one-third of this soil has been cleared at some time, but few areas are now cultivated. The land once cleared is now idle or is reforesting to shortleaf pine, persimmon, sassafras, briers, and vines. A few areas are in pasture. The soil is fairly well suited to pasture when planted to kudzu, sericea lespedeza, or other perennial crops that supply grazing and conserve the soil.

Crops do fairly well, but the soil is so difficult to till that the yields hardly justify the extra cost and effort.

Atkins silt loam (0 to 2 percent slopes) (Ao).—This poorly drained soil on first bottoms is associated with Monongahela, Philo, and other soils developed chiefly from acid sandstone and shale materials. It occurs mainly on sandstone plateaus, but some areas are located along streams well out in the valley. The surface is nearly level and subject to frequent flooding. The few exceptionally wet places are indicated

on the map by marsh symbols. The natural vegetation is chiefly moisture-loving deciduous trees. Oak, beech, poplar, sycamore, maple, gum, willow, and alder predominate. Most of this soil is scattered through the Allen-Hollywood-Christian-Atkins association.

Profile description:

0 to 4 inches, brownish-gray friable silt loam mottled with gray and brown; contains many roots; organic matter, moderate.
4 to 9 inches, light brownish-gray friable heavy silt loam, intensely mottled with gray and rust brown; organic matter, moderately low.
9 to 18 inches, medium-gray friable heavy silt loam to silty clay loam mottled with rust brown; very weak nutlike structure when dry, structureless when wet.
18 to 35 inches, medium-gray silty clay loam mottled with whitish gray and rust brown.
35 to 42 inches, light olive-gray silty clay loam mottled with gray and rust brown; slightly compact to firm in place.

The texture varies in the lower layers. Also, in some places the soil is more sandy throughout the entire profile, and in others limestone materials or layers of different kinds of material cause variation in texture. All layers are medium to strongly acid and moderate to low in organic matter. Roots can penetrate this soil, but the high water table limits plant development during much of the growing season.

Use and management.—Most areas of Atkins silt loam are fairly well suited to pasture, but drainage is too slow for crops requiring tillage. If artificial drainage were economically feasible, corn and certain hay crops could be grown.

About 35 to 40 percent of this soil is cleared. Most of the cleared area is in pasture and hay, since moisture relations favor these crops. The vegetation is generally poorer than on the better drained, more fertile soils. Sedges, redtop, bermudagrass, and other lowland plants and grasses predominate. Except on the wettest areas, the quality and quantity of the hay and pasture could be improved by seeding better varieties and by applying lime, potassium, and phosphorus. Corn yields on artificially drained areas are fair in normal years but very low during wet years.

Barbourville fine sandy loam (0 to 6 percent slopes) (Ba).—This light yellowish-brown to brown well-drained soil occurs in depressions or sinkholes and around heads of streams in areas underlain by acid sandstone and shale. The Abernathy soils occupy similar positions in the limestone valleys.

The soil consists of material washed from soils derived from acid sandstone and shale, such as the Hartsells, Enders, Tilsit, Linker, and Hanceville soils. It is closely associated with those soils. The surface is dominantly nearly level, but it is very gently sloping in some places. Surface drainage is moderate to slow, and practically all areas are temporarily flooded following heavy rains. Most areas of this soil are small and scattered throughout the sandstone plateaus. The natural cover, chiefly deciduous hardwoods, includes white oak, red oak, post oak, hickory, dogwood, and vines.

Profile description:

0 to 7 inches, light yellowish-brown fine sandy loam; contains a small amount of organic matter.
7 to 13 inches, light yellowish-brown friable fine sandy loam to very fine sandy loam; slightly splotched with weak yellow; moderately low in organic matter.

13 to 25 inches, moderate yellowish-brown friable loam to silt loam; contains some thin layers of very fine sand and silt; moderately low in organic matter.
25 to 40 inches, weak-brown mellow friable silt loam with some weak-yellow splotches; contains some organic matter.
40 to 52 inches, mottled weak brown, light yellowish-brown, and gray friable silt loam; gradual transition to weak-yellow friable clay loam; very little if any organic matter.

This soil varies from place to place in texture, color, and thickness. Depth to bedrock ranges from shallow to very deep. The texture ranges from fine sandy loam on the Sand Mountain plateaus to silt loam on the Little Mountain plateaus. The color varies from brownish gray to reddish brown, depending largely on the color of the soils from which the material of this soil was washed. The material is very permeable and strongly acid throughout the entire profile.

Use and management.—This is one of the soils best suited to agriculture on the mountain plateaus. It is productive and easily worked; it presents no conservation problems. Its permeability and position in well-drained depressions make moisture relations favorable for plant growth. It is well suited to all commonly grown crops and pasture.

Practically all of this soil has been cleared and is now used intensively for crops or pasture. Little fertilization is practiced, and lime is seldom used except where permanent pastures are seeded. Cover crops, other than small grains, are not commonly grown, and not much organic matter is returned to the soil. Heavier fertilization, the addition of organic matter, and applications of lime would increase yields.

Bruno loamy fine sand (0 to 6 percent slopes) (Bb).—This is the most sandy soil of the first bottoms. It consists of loamy fine sand or fine sand derived chiefly from sandstone materials that are somewhat influenced by limestone and shale. The soil is undulating to very gently sloping. Internal drainage is rapid to excessive, and all areas are periodically overflowed. Most of this soil is along the Tennessee River and Cotaco Creek. The original vegetation probably was scrub oaks, briers, and vines.

Profile description:

0 to 9 inches, light brownish-gray loamy fine sand; single-grained structure.
9 to 15 inches, brownish-gray loose loamy fine sand; contains some mica flakes.
15 to 28 inches, light brownish-gray loose loamy fine sand.
28 to 45 inches, light yellowish-brown loose fine sandy loam; contains some mica flakes.

This soil is slightly acid and low in plant nutrients and organic matter. It is open or very permeable. Infiltration is very rapid; there is very little, if any, runoff, even during heavy rains. The soil is too droughty for shallow-rooted crops.

Use and management.—This is a very poor soil for pasture and many crops. It is difficult to develop and to maintain and is droughty. Early maturing truck crops and deep-rooted crops are best suited. Much of this soil is now idle. Some areas are used for corn, small grains, and hay. Only light applications of fertilizer are made, and crop yields are generally low. Under heavier fertilization, areas that have favorable moisture produce fairly good yields.

Captina and Capshaw silt loams, undifferentiated (2 to 6 percent slopes) (Cb).—This undifferentiated mapping unit is composed of small bodies of Captina and Capshaw silt loams associated in such manner that it is not feasible to show them separately on the map. The profiles of the two soils are similar; they differ in that the Captina soil has a moderately dense siltpan at a depth of 20 to 24 inches, whereas the Capshaw soil has no siltpan, although it is somewhat compact at this depth. Both soils are imperfectly drained, but internal drainage of Captina silt loam is somewhat slower than that of the Capshaw. Their parent materials were washed from soils underlain by limestone somewhat influenced by acid sandstone and shale. The original vegetation consisted of oak, hickory, and gum.

The soils occupy nearly level to undulating topography on moderately low stream terraces in the limestone valleys, particularly the Tennessee and Moulton-Cotaco Valleys. They are closely associated with Etowah soils in small irregular shaped areas that range from less than 5 acres to more than 60 acres in size. The positions occupied by units of this complex are lower than those of the Etowah and somewhat higher than those of the Tupelo soils. The Capshaw soil resembles Etowah soils except in color and, in some places, texture.

Profile descriptions:

Captina silt loam:

0 to 5 inches, brownish-gray to light brownish-gray silt loam.
5 to 20 inches, yellow or brownish-yellow friable silty clay loam; contains some dark-brown stains or concretions.
20 to 30 inches, compact silty clay loam mottled with yellow and gray; slightly plastic in places.
30 to 90 inches, yellowish-brown silty clay; rather compact; has considerable light gray along cracks and crevices and some dark-brown coatings or concretions.
90 inches+partly weathered old alluvium consisting of sand, silt, and clay; contains beds of gravel in some places.

The thickness of the weathered alluvium is variable. The entire deposit may range from 2½ to 3 feet deep, or it may be absent in some places. Unweathered bedrock is at variable depths of 3 to 15 feet or more. The entire profile is strongly to very strongly acid.

Capshaw silt loam:

0 to 2 inches, brownish-gray to light brownish-gray friable silt loam; contains numerous rust-brown concretions; relatively high in organic matter.
2 to 4 inches, light brownish-gray friable silt loam; contains many concretions; low in organic matter.
4 to 8 inches, light brownish-gray friable silty clay loam.
8 to 15 inches, light yellowish-brown heavy silty clay loam or light silty clay; slightly firm in place but friable; somewhat plastic.
15 to 22 inches, moderate yellowish-brown friable silty clay weakly splotched with gray; moderately firm in place; contains many rust-brown concretions.
22 to 34 inches, weak-yellow silty clay slightly mottled with gray and rust brown; rather compact when dry, but friable under optimum moisture conditions.
34 to 45 inches, yellowish-gray heavy silty clay to clay mottled with pale yellow and rust brown; compact to firm in place; sticky when wet, hard and brittle when dry.

The material throughout the entire profile is permeable and strongly to very strongly acid. The number of rust-brown to nearly black iron

concretions on the surface and throughout the profile varies from place to place. The surface soil may be dominantly brown in some places and gray to yellowish gray in others.

Use and management. Both the Capshaw and Captina silt loams have good tilth and fairly good workability; they are adequately drained and easy to conserve. These soils have many of the favorable features of the Etowah soils but are not so well drained and warm up a little slower in spring. Some of the larger areas of this mapping unit are suitable for power farming.

About 75 percent of this undifferentiated mapping unit has been cleared and is now used for crops and pasture. Corn, cotton, and hay are the dominant crops. The most common hay crops are annual lespedeza and soybeans. The best yields are obtained under management practices that include the turning under of winter cover crops and the use of relatively large amounts of a well-balanced fertilizer.

Captina and Capshaw loams, undifferentiated (2 to 6 percent slopes) (Ca).—This mapping unit resembles Captina and Capshaw silt loams, undifferentiated, except in texture of the surface and subsurface layers. The soils occur in the valley coves where sandstone and limestone materials are mingled, especially in the upper part of the soil profile. This undifferentiated unit is closely associated with the Sequatchie, Holston, and Etowah loams, and, in some places, with Jefferson, Colbert, and Talbott soils. Some areas having slopes of 8 to 10 percent have been included. The larger areas are located along Six Mile Creek and Cotaco Creek and its tributaries.

Except for the surface and subsurface layers, the profile descriptions given for Captina and Capshaw silt loams, undifferentiated, apply equally well to this mapping unit. A description of the surface and subsurface layers in the Capshaw loam profile follow:

0 to 5 inches, light brownish-gray friable loam; moderately high in organic matter; strongly acid.
5 to 8 inches, brownish-yellow to light yellowish-brown friable heavy loam to light silt loam; relatively low in organic matter; strongly to very strongly acid.

The thickness of the two layers varies from place to place. In some areas the subsoil may contain more sand, fine sand, or very fine sand than does the subsoil of Capshaw silt loam and, also, there are fewer rust-brown concretions on the surface and in the upper profile.

Captina loam has surface and subsurface layers like Capshaw loam but differs in having a moderately dense siltpan at depths of 20 to 24 inches.

Use and management.—Captina and Capshaw loams, undifferentiated, has good workability, good conservability, and medium productivity. The soils are adequately drained for all crops commonly grown. They have many of the favorable features possessed by Etowah loam, Holston fine sandy loam, and Jefferson fine sandy loam, but they are somewhat less well drained and are usually a little slower to warm up in the spring.

Practically all of the areas of this complex have been cleared and are now used for crops and pasture. The dominant crops are cotton, corn, small grains, and hay, particularly annual lespedeza and soybeans. Crop yields and fertilizer practices are about the same as on the Captina and Capshaw silt loams, undifferentiated.

Christian loam, undulating phase (2 to 6 percent slopes) (CF).—This undulating, moderately productive soil on the uplands was derived from interbedded limestone, shale, and sandstone. In general, it occupies an intermediate position between the Little Mountain plateau and the Moulton-Cotaco Valley. The soil is well drained both externally and internally. It is closely associated with Pearman, Talbott, Tilsit, Colbert, and Decatur soils.

A major part of this soil is in the Allen-Hollywood-Christian-Atkins association. The original cover was deciduous hardwoods, chiefly oak, hickory, and gum, with some pine.

Profile description:

0 to 2 inches, light brownish-gray friable loam; contains a moderate amount of organic matter.
2 to 8 inches, moderate yellowish-brown friable light silt loam to heavy loam; relatively low in organic matter.
8 to 28 inches, weak reddish-brown to moderate reddish-brown silty clay; firm in place; nutlike structure; plastic when wet.
28 to 66 inches, light-brown compact silty clay splotched with gray and weak reddish brown, and mottled light yellowish brown, light brown, and rust brown in lower part; not so many brown concretions as in layer above.
66 to 84 inches, light yellowish-brown clay mottled with gray and rust brown; similar to the Colbert soils in subsoil structure and consistence.

Because the parent materials were derived from different sources, the color and texture of this soil vary from place to place. The layers are strongly acid throughout the profile. The surface texture varies from a fine sandy loam to clay loam.

Use and management.—This soil is moderately well suited to crops and pasture but requires good management. Corn and hay crops do better on many other soils. This is the most productive of the Christian soils because it is less eroded. It is fairly easy to work and conserve, but moderate moisture in the growing season limits its use.

Practically all of this soil is cleared and now used for cotton (60 percent), small grains and hay (15 percent), and corn (20 percent). The rest is used for pasture. Without much fertilization, crop yields are low. With suggested practices and fertilization, good yields can be obtained.

Christian loam, eroded undulating phase (2 to 6 percent slopes) (CE).—This soil is identical to Christian loam, undulating phase, except it has lost from 50 to 75 percent of its original surface layer through erosion. The surface color is brown to reddish brown. This is by far the most extensive of the Christian soils and is closely associated with Christian loam, undulating phase, as well as with Pearman, Talbott, Tilsit, and Colbert soils. Most of this soil is in the Allen-Hollywood-Christian-Atkins association.

The 3- to 6-inch surface layer is heavy loam; it varies in color, depending on the organic matter content and the amount of subsoil present. This soil is well drained, but the heavy dense subsoil causes some crops to suffer from lack of moisture. It is strongly to very strongly acid. A few areas of Christian clay loam, severely eroded undulating phase, are included.

Use and management.—Christian loam, eroded undulating phase, is moderately productive and fairly easy to work. Because of its moderately dense subsoil, erosion and drainage are hard to control.

Its general productivity is 5 to 30 percent lower than that of the uneroded undulating phase.

All of this soil has been cleared and is used for crops and pasture. Corn and hay are not so well suited as the other field crops commonly grown in the county. By using winter legumes and a good crop rotation, yields can be increased. In some areas contour cultivation, strip-cropping, and terracing may be beneficial.

Christian loam, eroded rolling phase (6 to 12 percent slopes) (CD).—This soil differs from Christian loam, undulating phase, in having stronger slopes that seldom exceed 12 percent. From 50 to 75 percent of its surface soil has been lost as a result of erosion. Internal drainage is somewhat retarded by the heavy subsoil. Most of the areas are associated with areas of other Christian soils throughout the Allen-Hollywood-Christian-Atkins association.

This soil includes a small acreage in forest that has not been materially altered by erosion. It also includes some small spots that have been severely eroded, and in these areas the plow layer consists almost wholly of reddish-brown or red firm silty clay loam. These severely eroded or gullied spots are indicated on the accompanying soil map by erosion symbol.

Workability, tilth, moisture absorption, and moisture-holding qualities have been impaired by erosion. In consequence, conservation problems, water runoff, and susceptibility to erosion have increased and the use suitability of this soil has been narrowed.

Use and management.—All but a small part of this soil has been cleared. Probably 75 percent or more of it is now used for field crops, and the rest for pasture. Some areas have reverted to forest, mainly old-field pine. Cotton, lespedeza, soybeans, small grains, and corn are the dominant crops. Because of its shallow surface layer and tight subsoil, this soil is probably better suited to cotton and small grains than to corn or soybeans. On slopes greater than 8 to 9 percent, kudzu and sericea lespedeza may prove best; on slopes below 8 percent most areas can be terraced satisfactorily for field crops.

Christian clay loam, severely eroded rolling phase (6 to 12 percent slopes) (CC).—This eroded soil is closely associated with the other Christian soils.

The surface soil is slightly redder and heavier because practically none of the original surface material remains. An estimated 75 percent or more of the surface layer has been lost through erosion. The present plow layer consists almost entirely of subsoil. Included in this phase is a very small acreage of Christian clay loam, severely eroded hilly phase.

Use and management.—This soil has been under cultivation for a long time. It is probably best used for kuzdu or some other close-growing permanent crop. When pastured, each area should be left idle periodically to allow the kudzu to reestablish itself.

Cobbly colluvium (Jefferson soil material) (0 to 6 percent slopes) (CG).—This land type occupies colluvial areas in the valley coves along swift-flowing streams that originate on the Sand Mountain plateaus or on steep mountain escarpments. It consists of fine sand, sand, small gravel, and all sizes of rounded sandstone cobblestones. External drainage is medium and internal drainage is rapid to ex-

cessive. The color of the surface soil and substratum is grayish brown. The natural cover is largely pine, with some hardwood. Most of this soil type is in the upper valley coves of Cotaco and Flint Creeks.

Use and management.—Some areas of this land type are used for crops, but the greater part is in unimproved pasture. Early spring truck crops do fairly well on the less stony areas. Because of stoniness, low fertility, and the droughtiness of the soil material, pastures furnish only temporary grazing. Truck-crop yields are often very low, and pasture grasses are of low quality. The land type is probably best suited to temporary grazing or forestry.

Colbert silt loam, level phase (0 to 2 percent slopes) (CP).—This soil chiefly differs from Colbert silt loam, undulating phase, in having smoother slopes. The poor consistence of the subsoil makes external drainage somewhat slow and the internal drainage moderately slow to very slow. The soil is closely associated with the other Colbert soils as well as with the Hollywood, Talbott, and other soils of limestone origin.

Use and management.—This soil is fairly well suited to crops and well suited to pasture grasses. Its natural productivity is fair, and its workability and conservability are fair to good. It may remain wet longer in the spring than Colbert silt loam, undulating phase, because it is more nearly level and surface water runs off more slowly.

Approximately 60 to 70 percent of this soil has been cleared and is now used for crops and pasture. The rest is forested. Crop suitability and yields are about the same as for Colbert silt loam, undulating phase. In some areas the grazing period is longer than for any other Colbert soil.

Colbert silt loam, undulating phase (2 to 6 percent slopes) (CR).—This yellow plastic soil of the upland is relatively shallow to clayey limestone bedrock, chiefly of the Bangor formation. It commonly occurs in small areas in close association with Talbott soils and other members of its own series at the base of and bordering rough limestone slopes. Some relatively level areas are scattered throughout the valley.

Surface drainage is generally adequate, but internal drainage is retarded. The original cover was predominantly hardwoods, with some cedar. Practically all of this soil—the most desirable of the Colbert series—is in the Allen-Hollywood-Christian-Atkins soil association.

Profile description:

0 to 2 inches, brownish-gray friable silt loam; relatively high in organic matter.
2 to 6 inches, light yellowish-brown heavy silt loam to silty clay; contains some organic matter.
6 to 11 inches, moderately yellowish-brown heavy silty clay to clay; plastic and sticky when wet, compact when dry; nutlike to blocky structure.
11 to 20 inches, light yellowish-brown to moderate yellowish-brown massive clay mottled with strong brown and gray.
20 to 30 inches, heavy plastic clay moderately mottled with dusky yellow, gray, and yellowish brown.
30 to 45 inches, heavy, massive, plastic and sticky clay intensely mottled with yellowish gray, moderate brown, and weak yellow.
45 to 55 inches, mottled weak-yellow, gray, and light-brown heavy, sticky, plastic clay; contains some lime nodules.

The reaction is strongly acid to a depth of 45 inches, although the underlying rock is calcareous. About three-fourths of this soil has been cleared and has lost 25 to 50 percent of its surface layer through erosion. Much of the rest is forested. The surface soil is dominantly yellowish brown but ranges from the medium brown or strong brown of the Talbott to the olive black of the Hollywood. The texture of the surface soil is commonly silt loam to heavy silt loam, but more or less fine to very fine sand is present in areas influenced by sandstone residuum. Outcrops of limestone bedrock are fairly common.

Use and management.—This soil is fairly well suited to crops requiring tillage and to pasture. Its productivity is only fair, however, because it has moderately low natural fertility and unfavorable moisture relations. The plastic clay subsoil and shallow depth to bedrock limit its capacity for holding moisture for plants. Its workability is satisfactory, except where subsoil material is included in the plow layer. In such case the soil is plastic when wet, rather hard when dry, and can be tilled only within a narrow range of moisture conditions. Because of its slow permeability, runoff develops quickly during heavy rains and causes erosion even on the gentle slopes. Pasture plants such as white clover and lespedeza are suited where lime and phosphorus have been applied, but their growth is limited especially on the more eroded parts, by droughtiness of this soil.

About 75 percent of this soil has been cleared and is used for crops and pasture. It is best suited to hay, cotton, small grains, corn, and pasture. Where the crops are rotated to include a legume, such as soybeans, annual lespedeza, cowpeas, or some winter legume, the other general field crops show improvement. Cotton and corn yields are generally low under common practices; the yields improve under good management and favorable moisture conditions. Annual lespedeza is the most common hay and pasture crop on this soil.

Colbert loam, undulating phase (2 to 6 percent slopes) (Co).—This soil is much like Colbert silt loam, undulating phase, except in surface texture and occasionally in subsurface texture. Most of the soil has lost 25 to 30 percent of its original surface layer through erosion.

This soil is closely associated with Jefferson and Talbott soils, as well as with other soils of its own series.

The preceding profile description of Colbert silt loam, undulating phase, applies equally well to this soil, except for the surface and subsurface layers, which are described below:

0 to 5 inches, light brownish-gray friable loam to very fine sandy loam; contains a moderate amount of organic matter; strongly to very strongly acid.

5 to 8 inches, light yellowish-brown to moderate yellowish-brown friable silt loam to very fine sandy clay loam; relatively low in organic matter; varies in depth from place to place or may be absent; where it is absent, the surface layer rests more or less directly on the heavy plastic clay; strongly acid.

The origin of the sand in this soil is not definitely known. It is thought that in some areas the sand may have rolled or washed down from the top of the sandstone plateaus and that in others it was derived through weathering and settling, more or less in place, of the sandstone capping on top of the weathered limestone. The soil has an occasional limestone rock outcrop.

Use and management.—This soil is fairly to moderately well suited to crops requiring tillage and to pasture. Its workability is good, except where the subsoil is mixed with the plow layer. Fertility is moderately low, and the heavy plastic subsoil has produced unfavorable moisture conditions. With proper terracing and use of green-manure crops, this soil is fairly productive of many of the commonly grown crops.

About 80 percent of this soil has been cleared and a large part is now used for crops and pasture. The workability is probably somewhat better than that of Colbert silt loam, undulating phase, but all the other characteristics are about the same.

Colbert loam, eroded undulating phase (2 to 6 percent slopes) (CL).—This soil is like Colbert loam, undulating phase, except it has lost from 50 to 75 percent of its surface layer through erosion. It is associated with other Colbert soils, as well as with Jefferson, Pearman, and Talbott soils.

The profile is similar to that of Colbert loam, undulating phase, except the surface layer is thinner and contains less organic matter. Where the subsoil is mixed with the surface layer by cultivation, the surface texture is heavier and approaches a silt loam.

Use and management.—This soil is fairly well suited to tilled crops and pasture. Its productivity is medium to low because of its unfavorable moisture relations and moderately low natural fertility. The capacity for holding moisture for plants is limited by its heavy plastic clay subsoil. Workability is good except where erosion has removed so much of the original surface layer that a part of the heavy subsoil is included in the plow layer.

All of this soil has been cleared and, at some time, used for crops and pasture. Probably 50 percent is used for cotton, 15 percent for corn, and 20 percent for small grains and hay crops. The rest is used for pasture or is idle. Crop yields are not very high under ordinary conditions because the soil is droughty. With the use of green-manure crops and moderately heavy applications of fertilizer and lime, higher crop yields and longer periods of grazing can be obtained.

Colbert loam, rolling phase (6 to 12 percent slopes) (CN).—This soil is closely associated with Talbott loam, eroded rolling phase, with Jefferson soils, and with other Colbert soils. In many places it occupies foot slopes similar to those of the Allen and Jefferson soils. Much of this soil has lost at least one-fourth of its original surface layer. Except for slope and surface texture, this soil is much like Colbert silt loam, undulating phase.

Use and management.—This soil is not well suited to crops requiring tillage and is only moderately productive of pasture grasses. It has medium workability and low natural fertility because it is droughty and rather hard to conserve. It may be suitable for long rotations consisting of close-growing small grains, hay, and pasture. Its best use is for pasture.

About two-thirds of this soil has been cleared and used for crops and pasture. Cotton, hay, and some small grains are dominant. Under ordinary management, crop yields are rather low; even with improved practices they cannot be expected to be high. Tillage

should be on the contour. With proper fertilization and liming, fair stands of Dallisgrass, lespedeza, and white clover can be maintained in most places, although the stand may be damaged during dry periods.

Colbert loam, eroded rolling phase (6 to 12 percent slopes) (CK).—This soil is characterized by its yellowish-gray surface soil and yellowish-brown heavy plastic clay subsoil mottled with gray and brown. From 50 to 75 percent of the original surface soil has been lost through erosion. A part of the present surface layer consists of materials from the upper subsoil. This soil is closely associated with the other Colbert soils.

Use and management.—Most of this soil has been cultivated, but a large part is now used for pasture or for forest because of its poor workability, strong slopes, poor moisture-absorbing qualities, and severe erodibility. Under present economic conditions, terracing for tilled crops is not profitable on those areas having stronger slopes. Nevertheless, terracing for close-growing crops may be practicable for many areas.

Some of this land is used for cotton, corn, lespedeza, and other general farm crops, but a large part of it is used for pasture. Annual lespedeza, bermudagrass, and Dallisgrass, the principal pasture grasses, produce fair to good grazing for short periods in the year. Sericea lespedeza is a useful crop for hay and pasture. It fits especially well as a source of forage because it checks erosion and helps rebuild the soil.

Colbert loam, hilly phase (12 to 20 percent slopes) (CM).—This soil occupies a position similar to that of Muskingum fine sandy loam, hilly phase, but differs from it in having a finer texture, a heavier subsoil, and less stone on the surface and throughout the profile. The subsoil, a yellowish-brown heavy plastic clay with considerable mottling of gray and brown, is similar to that of Colbert loam, rolling phase. Occasional limestone rock outcrop, small sandstone boulders are present, and some spots have numerous chert fragments similar to those in areas of Colbert cherty silt loam.

This soil is not extensive. Most areas occur on the lower slopes of Little Mountain south of Trinity.

Use and management.—Because it is hilly, this soil is not well suited to crops or pasture grasses. Most of it is in forest and probably should remain so unless additional pasture is urgently needed. Some early spring grazing may be had by employing methods somewhat similar to those used on the open range.

Colbert silty clay loam, eroded undulating phase (2 to 6 percent slopes) (CT).—This soil differs from Colbert silt loam, undulating phase, in having lost more of its surface material through erosion and in having a heavier surface texture. Erosion has worn away from 50 to 75 percent of the original surface soil. This great loss has brought about a change in color and texture of the present surface layer. The upper subsoil has also been affected to some extent. In general, the present surface layer consists of a small percentage of the original surface or subsurface materials mixed with soil materials from upper subsoil. The 3- to 6-inch surface soil is olive-brown to yellowish-brown friable silty clay loam. It is quite

sticky when wet. The thickness of this layer varies from place to place, depending on the depth to which the soil has been tilled. The subsoil is a yellowish-brown, sticky, mottled clay that becomes more gray with depth.

This soil is more extensive than Colbert silt loam, undulating phase; most of it is in the Allen-Hollywood-Christian-Atkins association. A few areas occupying a slope of less than 2 percent are included.

Use and management.—This soil has fair to poor workability and moisture-absorbing capacity. It has more rapid surface drainage and less drought resistance than Colbert silt loam, undulating phase. Drainage is unfavorable, and plants are damaged by droughts. Most of the acreage is probably best used for pasture.

Practically all of this soil has been cleared, and a rather high percentage of it is used for tilled crops and pasture. The rest is idle or has reverted to forest. Cedar and pine are the more common trees on the reforested areas. Cotton, small grains, and hay (chiefly annual lespedeza) are the dominant crops. Under common management, yields are low; under good management they cannot be expected to be high but can be increased materially.

This soil, like others of its series, is less responsive to winter legumes than most of the well-drained valley soils, but on those areas having good surface drainage, fairly good returns may be expected. When used for crop production, this soil should be operated under a long rotation consisting of small grains, hay, and pasture. All tillage should be done on the contour, and the land should be properly terraced. If properly fertilized and limed, fair to good stands of lespedeza, white clover, and some grasses can be established that will provide considerable grazing and retard erosion.

Colbert silty clay loam, eroded rolling phase (6 to 12 percent slopes) (Cs).—This soil is similar to Colbert silty clay loam, eroded undulating phase, in texture and profile development but it occupies stronger slopes. Most of the acreage has been eroded to the extent that subsoil material is in the plow layer. An estimated 50 to 75 percent of the surface layer has been lost in most places, and in a few nearly all of the surface layer and part of the subsoil are gone.

This soil is not extensive. It is closely associated with the other Colbert soils, which are scattered through almost all of the valley areas of the county.

Use and management.—A small acreage of this soil is used for growing cotton, small grains, corn, lespedeza, and other general farm crops, but its chief use is for pasture. Crop yields can be expected to be low on most areas. Annual lespedeza, hop clover, white clover, and Dallisgrass are the principal pasture grasses. Fairly good grazing is obtained, especially where fertilizer and lime are applied. Sericea lespedeza appears to be fairly well suited, although it is somewhat slow in getting started. It is an excellent hay crop, makes good supplementary pasture, and aids in erosion control.

This soil is best used for pasture. Close-growing crops may be feasible for some areas if terraces are employed. Row crops are not considered practical, as terracing for such crops would not be feasible.

Colbert cherty silt loam, rolling phase (6 to 12 percent slopes) (Ch).—This soil is somewhat similar to Colbert loam, rolling phase,

in position and parent material. It differs chiefly in having a heavier, or finer, surface texture and in having numerous chert fragments on the surface and throughout the entire profile. The chert fragments range from ¼ to 6 inches in diameter but normally are 1 to 3 inches in diameter.

This soil occurs on gently sloping to rolling relief in relatively small units. Generally it is associated with other Colbert soils, or with stony land types consisting of Talbott and Colbert soil materials or of limestone rockland. It occupies the smoother tops of limestone ridges and is less stony than the stony land types.

In some places, the profile is similar to that of the Colbert silt loam soils in materials, color, texture, and consistence, and in others it is similar to the profile of the Talbott soils. Some of the larger areas are near Center Grove in the Moulton-Cotaco Valley.

Use and management.—Less than half of this soil has been cleared, and much of it is idle. A few patches are used for cotton, corn, and pasture. Crop yields are low, since proper cultivation is hindered by so much chert. With the use of phosphorus, potassium, and lime, moderately good grazing may be had for short periods.

This soil is not well suited to crops requiring tillage but is fairly well suited to pasture. It is probably best suited to pasture and forest.

Cotaco loam (2 to 4 percent slopes) (Cu).—This soil consists of local alluvial-colluvial accumulations washed from Hartsells, Tilsit, Muskingum, and associated soils. It occupies shallow depressional positions, or sinks, and heads of intermittent drains; it also occurs at the base of slopes of Muskingum and Pottsville soils and in places with Hanceville and Tilsit soils. The areas are slightly depressional to nearly level or gently sloping, although the slopes are seldom greater than 3 or 4 percent. The soil occupies a position similar to that of the Barbourville soil and is derived from similar materials but it is not so well drained. The native cover consists of oak, hickory, poplar, pine, and gum.

Cotaco loam is characterized by its rather loose, mellow, newly accumulated sand and silt loam soil materials. It has little or no differentiation of texture in the profile layers and only slight differences in the color of the surface soil and the subsoil. This soil is rather extensive in the area. Most of it is in the Tilsit-Linker-Cotaco soil association.

Profile description:

0 to 6 inches, light brownish-gray to light yellowish-brown mellow loam; moderately high in organic matter.

6 to 12 inches, light yellowish-brown friable loam to light silt loam; low in organic matter.

12 to 19 inches, dark yellowish-brown friable silt loam to silty clay loam mottled with shades of gray and brown; comparatively high in organic matter.

19 to 36 inches +, yellowish-gray to yellowish-white friable silty clay loam streaked with light gray and yellowish gray; very low in organic matter.

Considerable variation in this soil occurs from place to place, especially in depth of the recently accumulated colluvial materials. The texture varies from a moderately loose fine sandy loam to a friable silt loam, the loam being the dominant texture. The entire profile is very strongly acid; drainage varies from imperfect to moderately poor.

Use and management.—This soil is well suited to many tilled crops and is well suited to pasture. Its productivity is moderately high for crops that respond to or can withstand considerable moisture. The workability is good, although moisture conditions make cultivation in the spring or following heavy rains less favorable than on some soils.

About 90 percent of this soil has been cleared and is being used for corn, sorghum, soybeans, annual lespedeza and sericea lespedeza, sweetpotatoes, gardens (especially fall gardens), and pasture grasses. Some fertilizers are required for best crop production.

Crossville loam, undulating phase (2 to 5 percent slopes) (Cv).—This soil is identified by its brown color, shallow depth to bedrock, loam texture, and occurrence in depressional or gently sloping positions. It is closely associated with Hartsells, Linker, and Muskingum soils and is influenced considerably by seepage waters. The areas are small and widely distributed throughout the Hartsells-Enders-Muskingum soil association. The native vegetation consists of deciduous hardwood and coniferous trees.

Profile description:

0 to 3 inches, brownish-gray mellow friable loam; organic matter, moderately high.
3 to 7 inches, weak reddish-brown friable fine sandy clay; crumblike structure: organic matter, moderate.
7 to 15 inches, moderate reddish-brown friable fine sandy clay; slightly sticky when wet; organic matter, relatively low.
15 to 25 inches, moderate reddish brown friable fine sandy clay; somewhat sticky when wet; contains some organic matter and many roots; rests on firmly bedded fine-grained sandstones.

The soil is strongly to very strongly acid. The main variation is in the depth to bedrock, which ranges from less than 12 inches to about 30 inches, but more commonly occurs 15 to 25 inches below the surface.

Use and management.—This soil is well suited to growing small grains, truck and hay crops, and pasture. The workability and moisture-holding qualities are good.

About 30 percent of this soil has been cleared and improved for cultivation or pasture. The rest is in forest. For pasture purposes, lespedeza and white clover afford excellent grazing when the soil is well fertilized and limed. Where the depth to bedrock is less than 15 inches, the soil is rather droughty during prolonged dry periods. Such areas, however, usually receive some seepage water and are able to withstand considerable dry weather. The deeper areas are suited to corn, and good yields may be expected when the crop is fertilized with nitrogen. A rotation of corn, hay, and pasture appears to be suited.

Cumberland silt loam, level phase (0 to 2 percent slopes) (Cw).—This soil is closely associated with Cumberland silt loam, undulating phase. It differs from the undulating phase in slope and thickness of the surface layer, which averages from 1 to 3 inches thicker than on the undulating phase. This soil, therefore has a higher organic-matter content and a greater moisture-holding capacity.

Use and management.—Practically all of this naturally fertile soil is cleared and is used for crops and pasture. It has good workability, high water-holding capacity, and is easy to conserve. It is well suited to all crops commonly grown, including alfalfa.

Although yields may be from 3 to 8 percent higher on the level phase, crop rotations and other practices used are similar to those on the undulating phase. Erosion is almost negligible, but the turning under of green-manure crops helps to maintain the soil and increases the organic-matter content. Probably more corn and alfalfa are grown on this soil than on the undulating phase.

Cumberland silt loam, undulating phase (2 to 6 percent slopes) (Cx).—This brownish-gray to reddish-brown fertile soil has developed on stream terraces that consist of material predominantly from limestone but to some extent from sandstone and shale. Both surface and internal drainage are moderate. The original cover consisted of oak, hickory, poplar, blackgum, sourwood, and chestnut, but most of this growth has been removed or cut over. The areas are rather small and widely scattered over the valleys, but the largest part is in the Decatur-Waynesboro-Cumberland-Etowah association near Decatur.

Profile description:

0 to 2 inches, brownish-gray to weak-brown friable silt loam; relatively high in organic matter; slightly acid.
2 to 5 inches, moderate yellowish-brown friable silt loam; contains a moderate amount of organic matter; medium to strongly acid.
5 to 8 inches, moderate yellowish-brown to strong yellowish-brown friable heavy silt loam; uniform in color and low in organic matter; very strongly acid.
8 to 26 inches, light-brown to moderate reddish-brown friable silty clay loam; slightly compact to firm in place; very strongly acid.
26 to 40 inches, moderate reddish-brown silty clay loam; firm in place but friable; very strongly acid.
40 to 48 inches, moderate reddish-brown to strong reddish-brown compact but moderately friable silty clay; very strongly acid.

This soil differs in the relative depth of the loose friable surface soil and the content of sand, fine sand, very fine sand, or silt. Small water-worn gravel may be present on the surface or throughout the profile. Fine chert fragments may occur in places, but the gravel, chert fragments, or small cobbles are seldom very numerous. The reddish-brown or red subsoil ranges from approximately 40 inches to 8 feet or more in depth, but averages between 48 and 66 inches. The fertility of this soil is high and it has moderately good permeability to roots and water. Impaired percolation causes greater runoff than on some soils.

Use and management.—This is one of the most fertile soils of the county. It is well suited to both crops and pasture. Its undulating surface, good internal drainage, and the friable nature make it easy to work and conserve. If properly managed it is suited to a relatively short rotation and a wide variety of crops.

Most of this soil has been cleared; about 40 percent is used for cotton, 25 percent for corn, 15 percent for small grains, and the rest for hay and pasture. Heavy fertilization is practiced, and 2- to 3-year rotations are commonly followed. Areas to be used for alfalfa are invariably limed and well fertilized with phosphorus and potassium.

Good response to moderately heavy applications of a complete fertilizer can be expected. Some attention should be given to the control of runoff on the more sloping positions if the soil is to be kept highly productive. Erosion can be minimized by using close-growing grains, hay, and winter cover crops and by practicing contour tillage and stripcropping on the more sloping areas.

Cumberland silty clay loam, eroded undulating phase (2 to 6 percent slopes) (Cy).—This is by far the most extensive of the Cumberland soils mapped in the county. It is more eroded than the silt loams and also differs in surface texture. It is on the high old stream terraces where the parent materials are predominantly from limestone. Internal drainage is moderate. Most of this soil is in the Decatur-Waynesboro-Cumberland-Etowah association, in the vicinity of Decatur and Priceville, but small areas are widely scattered throughout the larger limestone valleys. The original cover was chiefly hardwoods, although some pines have grown on cutover or idle land.

The profile is similar to that of the undulating phase of Cumberland silt loam, except in the surface and subsurface layers, which are described as follows:

0 to 4 inches, reddish-brown to moderate red moderately friable silty clay loam; sticky and plastic when wet and puddles if worked when too wet; if worked at optimum moisture, breaks into a fairly friable mass.

4 to 8 inches, red to reddish-brown moderately friable silty clay loam; firm in place but permeable; variable in depth; layer entirely absent in places, and in these the surface soil rests on the heavier and denser subsoil.

Depth of tillage and degree of erosion have determined the thickness of the surface layers to a large extent. They are medium to strongly acid. Included with this soil are a few areas of Cumberland silty clay loam, severely eroded rolling phase.

Use and management.—This soil is well suited to crops and pasture, although only a small acreage is used for grazing. Erosion has changed many of the good physical properties of this soil so that it is more difficult to work and conserve than Cumberland silt loam, undulating phase. Its productivity is lower, especially for corn and hay crops. It has good chemical properties however, and if built up by green-manure crops, contour tillage, and terracing, fairly good yields are obtained, particularly if corn follows winter legumes that have been turned under.

All of this soil has been in cultivation, and most of it is used for crops each year. Cotton is dominant, and yields average only slightly less than on the silt loam. Oats, wheat, and other winter crops do well; they frequently follow cotton. No fertilizers are used at the time of seeding small grains, but a topdressing of nitrogen fertilizer should be applied in the spring.

Longer rotations should be used on this soil to avoid further loss by erosion. On the more severely eroded unproductive places, substantial applications of manure or other fertilizers are necessary.

Cumberland silty clay loam, severely eroded rolling phase (6 to 12 percent slopes) (Cz).—This is one of the most severely eroded red soils of the stream terraces in the county. It differs from Cumberland silty clay loam, eroded undulating phase, in having stronger slopes and a thinner surface layer. This is so severely eroded that the plow layer is composed almost entirely of upper subsoil materials. The external drainage tends to be excessive in most places, but the internal drainage is moderate.

Use and management.—Workability of this soil is poor, moisture absorption is slow, and moisture-holding capacity is reduced. Because of the slow moisture absorption, during dry spells crops are

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damaged more quickly on this soil from lack of moisture than on the less severely eroded or uneroded soils. This soil has good chemical properties and can be rebuilt to a fairly productive state if the more gentle slopes are properly terraced and green-manure crops are turned under.

All of this soil was once cultivated but because of severe erosion a large percentage is lying idle or is in pasture. Probably less than 20 percent is used each year for growing general field crops. Although cotton is the principal crop, some soybeans, cowpeas, and annual lespedeza are grown, but returns are low. Corn yields are generally low unless the soil has been improved by terraces or the corn follows a winter legume.

This soil appears to be suited to sericea lespedeza and kudzu. Both produce fair to good yields of high-quality hay and can be used as supplemental grazing for short periods when other pasture crops are short. Although they are productive over a period of years, each crop requires special care and considerable time to become established. Sericea lespedeza should be located on the milder slopes for ease in harvesting, but kudzu may be planted on steeper slopes and even on badly gullied areas. These crops are very useful in reducing erosion and in rebuilding badly eroded areas.

Voluntary reseeding of annual lespedeza, hop clover, and Dallisgrass furnishes most of the pasture grazing. Some areas have reverted to forest, whereas others have been reforested by planting seedlings of pine and black locust or other trees.

Decatur silt loam, undulating phase (2 to 6 percent slopes) (DA).—This productive smooth to undulating red to reddish-brown soil of the uplands has developed from high-grade limestone. The soil material is about 12 to 20 feet thick over bedrock in many areas and may be even deeper in places. It is well drained and occupies broad low ridges only slightly higher than those on which some more typical areas of Dewey soils occur. It is closely associated with other phases of the Dewey series as well as with the Decatur, Abernathy, and Cumberland soils. Much of it lies in small areas widely distributed in the Decatur-Waynesboro-Cumberland-Etowah and Decatur-Talbott-Dewey-Robertsville soil associations. The native deciduous forest consisted largely of chestnut oak, hickory, maple, and cedar. Some pines are now present on idle or cutover land.

Profile description:

0 to 2 inches, weak reddish-brown friable silt loam; organic matter, relatively high.

2 to 5 inches, brown to medium-brown friable silt loam to heavy silt loam; contains some grit and small brown concretions; organic matter, moderate.

5 to 10 inches, moderate reddish-brown friable silty clay loam to heavy silty clay; fine to medium, irregular nut structure; organic matter, comparatively low.

10 to 21 inches, moderate reddish-brown to brown moderately friable light silty clay; contains very little organic matter; dense; plastic when wet.

21 to 39 inches, moderate reddish-brown to strong reddish-brown heavy silty clay to clay; moderately friable but firm in place; plastic and sticky when wet but blocky when dry; contains some brown concretions.

39 to 65 inches, strong reddish-brown dense and firm clay; contains some small chert fragments which increase in number with depth; moderately friable under optimum moisture conditions.

The thickness of the surface layer varies according to the amount of erosion that has taken place. The soil is medium to strongly acid throughout the profile. Numerous chert fragments ¼ to 2 inches in diameter occur in places. No areas contain enough chert to interfere with cultivation.

Use and management.—This is one of the most suitable soils for crops and pasture in the area. Because it is silty, it is more difficult to till than some of the coarser textured soils. Also, runoff begins earlier during heavy rainfall. Although moisture is not absorbed rapidly, surface and internal drainage are good. During extended dry seasons the soil dries out and becomes very hard, but cotton will continue to grow on it. In addition, this soil is well suited to such exacting crops as alfalfa, red and crimson clovers, corn, and small grains.

All of this soil has been cleared and is now used for tilled crops, hay, and pasture. Considerable fertilization is practiced. Crop rotation is practiced, but row crops are generally grown several years in succession. If this soil is to be kept highly productive, somewhat longer rotations will need to be used.

Fertilization varies according to conditions on the farm and depends to a large extent on whether or not a winter or summer cover crop is grown. Corn following a winter cover crop such as vetch may bring excellent yields. Some farmers plant vetch in the cotton rows late in summer, plow under the vetch in spring, and plant corn. This rotation can be lengthened by planting oats or wheat after the corn, and an annual hay crop after the oats or wheat. Many kinds of rotations are practiced, but vetch is increasingly prominent in them. Rotations suggested by the Tennessee Valley substation, at Bella Mina, in Limestone County, should be appropriate, as the station is partly located on Decatur soils.

Decatur silty clay loam, eroded undulating phase (2 to 6 percent slopes) (DB).—This eroded undulating soil is mapped in the western and northwestern parts of the county in close association with Decatur silt loam, undulating phase, and other Decatur soils, as well as with Dewey, Cumberland, and Talbott soils. It is the most extensive soil of the Decatur series. The material from which it was derived was formed in place from high-grade limestone. Except for the thinner surface layer and heavier surface texture, the profile of this phase is practically the same as that of Decatur silt loam, undulating phase. In most places 50 to 75 percent of the original surface soil has been removed by erosion. The plow layer, a mixture of the surface and subsurface layers, is more reddish brown than brown. The entire profile is medium to strongly acid. Surface and internal drainage are good.

Use and management.—This soil is desirable for crops and pasture, but because of erosion, moisture is not absorbed so rapidly, runoff is excessive during heavy or rapid rainfall, and the soil dries out and becomes rather hard during extended dry periods. Since organic matter is depleted in the surface soil, erodibility is increased, the soil is more difficult to cultivate, and crops, particularly corn and summer hay crops, suffer more from lack of moisture.

About all the locally grown crops are planted on this soil. Cotton, the chief crop, can withstand the dry seasons better than most crops,

and it does fairly well when commercial fertilizers are added. Corn is planted to a lesser extent. Where a winter cover crop is turned under, or fairly liberal amounts of commercial fertilizer are used and the growing season is not too dry, good corn yields can be expected. Wheat and oats are not grown extensively. Alfalfa, lespedeza, cowpeas and soybeans are grown for hay. Permanent pasture grasses furnish considerable grazing during much of the year when supplied with lime, phosphorus, and potassium.

Some excellent results are had from planting winter legumes as cover crops and turning them under in the spring. This practice, together with contour plowing, stripcropping, and terracing, should be beneficial.

Decatur silty clay loam, severely eroded rolling phase (6 to 12 percent slopes) (Dc).—This soil has a stronger slope and is more eroded than Decatur silty clay loam, eroded undulating phase. Practically all of the surface soil and, in places, part of the subsoil have been worn away. The plow layer differs but little from the underlying subsoil and consists mainly of reddish-brown to red dense silty clay loam to silty clay. Many shallow gullies, occasionally 1 to 3 feet deep, are not crossed easily with farm machinery. The entire profile is medium to strongly acid. The soil is associated with other Decatur soils in the Tennessee and Moulton-Cotaco Valleys.

Use and management.—The firm consistence of the plow layer makes tillage difficult, and strong slopes limit use. Moisture relations are less favorable and the fertility of the plow layer is lower than for the less eroded Decatur soils.

All of this soil has been under cultivation but only a small percentage is now used for tilled crops and pasture. Most of it is either idle or reforested. Crop yields vary according to management practices, but they are generally low under the methods used. The soil will grow pasture grasses for only short periods.

Good pastures probably could be established if adequate moisture could be made available to the plants. Contour plowing and terracing would conserve moisture, and cover crops would increase the permeability of the soil and add organic matter. Kudzu or sericea lespedeza is a well-suited permanent cover crop, particularly if the land is limed and fertilized.

Dewey silt loam, undulating phase (2 to 6 percent slopes) (Dd).—This soil is characterized by a brown surface layer and strong-brown to pale reddish-brown subsoil. It occupies undulating to very gently sloping fairly broad ridgetops in the uplands or small tablelands in the limestone valleys. It is the most typical of the Dewey soils and occurs in comparatively small units.

The soil has developed from a fairly deep layer of fine materials, relatively free from chert fragments or other coarse materials, that usually overlie beds of highly cherty materials. The fine materials are mainly the residue weathered from fairly high-grade limestone or dolomitic limestone.

This soil is associated with other phases of Dewey soils and with Decatur and Talbott soils in the redlands and alluvial plains and on the low limestone ridges and in the valleys. The native vegetation was largely deciduous forest consisting of chestnut oak, hickory, maple, and some cedar. On cutover or idle land pines are dominant.

Profile description:

0 to 7 inches, weak-brown to dark-brown mellow friable silt loam; contains moderate amount of organic matter and some small chert fragments.
7 to 11 inches, moderate-brown heavy silt loam or light silty clay loam; granular structure; very little organic matter.
11 to 18 inches, strong-brown friable heavy silty clay loam to silty clay; granular or crumb structure.
18 to 37 inches, strong-brown to reddish-brown friable silty clay; contains some brown concretions and small chert fragments; irregular nutlike structure.
37 to 62 inches, pale reddish-brown to weak-brown friable silty clay slightly splotched with light yellowish brown; contains numerous small chert fragments and rust-brown concretions.

The profile is medium acid in the upper layers and very strongly acid in the lower subsoil. Because considerable erosion has taken place and the subsoil has become mixed with the plow layer by tillage, the thickness of the surface layer varies from place to place. In a few areas where very little erosion has developed the brown silt loam layer is 8 to 10 inches thick, but in those places where erosion has been more severe the surface layer is much thinner. In the vicinity of Trinity the subsoil is occasionally much heavier than that typical of the Dewey series.

Use and management.—This is one of the most desirable soils in the county for agricultural use, as it is smooth, fertile, well drained, and permeable to roots and moisture. It is also very productive, easily worked and conserved, and well suited to all crops commonly grown, including alfalfa. The organic-matter content appears to be high in protected areas where little or no surface materials have been lost through erosion. Continuous cropping does not seem to seriously reduce the organic content.

Practically all of this soil has been cleared and is now generally used for crops and pasture. Cotton, corn, and hay are the most important crops. Cotton is the dominant, but the corn acreage is only slightly less, especially on farms where winter legumes follow cotton and corn follows the winter legume.

A crop rotation that includes winter legumes would help to maintain high productivity and good tilth and help to control sheet and gully erosion.

Dewey silty clay loam, eroded undulating phase (2 to 6 percent slopes) (DL).—This soil differs from Dewey silt loam, undulating phase, in having lost one-half or more of its original surface layer through erosion. It was derived mainly from high-grade limestone. It is closely associated with Decatur soils and other soils of its own series. Some areas are extensive. Most of the soil is in the Tennessee and Moulton-Cotaco Valleys.

The 3- to 6-inch surface layer is a reddish-brown silty clay loam. It is friable under optimum moisture conditions but somewhat sticky when wet. The underlying materials are similar to those in corresponding layers of Dewey silt loam, undulating phase. In many places little chert appears within the soil mass or on the surface, but in areas closely associated with cherty soils some fragments occur throughout the profile. The scattered fragments do not interfere with cultivation.

Use and management.—All of the soil has been cleared and cultivated, and very few areas are now idle. The heavy, clayey plow layer

makes this soil rather difficult to cultivate and conserve, but in all other respects it is as desirable as Dewey silt loam, undulating phase, for all the commonly grown crops. Although the fertilizer treatments and tillage methods are similar on the two soils, the management requirements should be more exacting on this phase so that further erosion may be prevented and high yields maintained. In addition to winter legumes as cover crops, contour plowing, stripcropping, and terracing, where necessary, would benefit this soil. Cotton, corn, small grains, and hay are the major crops. Some areas are in pasture.

Dewey silty clay loam, eroded rolling phase (6 to 12 percent slopes) (DE).—This soil differs from Dewey silty clay loam, eroded undulating phase, in having stronger slopes; and from Dewey silt loam, undulating phase, in having a redder surface layer and heavier texture. This change in color from weak brown to reddish brown and the change in texture were brought about by mixing the subsoil with the surface layer during cultivation. Between 50 to 75 percent of the original surface has been lost by erosion, and the plow layer now consists of upper subsoil mixed with the remaining surface soil. This eroded rolling phase is closely associated with the other Dewey soils.

The 3- to 6-inch surface layer rests directly on the firm silty clay subsoil in most places. The lower part of the profile is similar to that of Dewey silt loam, undulating phase.

Use and management.—This is one of the more fertile soils of the county, but the loss of the original surface materials has reduced organic content, impaired tilth, lowered moisture availability, and increased surface runoff and erodibility. The soil is well suited to many commonly grown crops and pasture.

All of this soil has been cleared and cultivated, but some areas are now idle or in pasture. Cotton, corn, small grains, and hay, including alfalfa, are the chief crops. The average yields range from 20 to 40 percent below those on Dewey silt loam, undulating phase. Sericea lespedeza, a deep-rooted perennial legume, is of considerable aid in erosion control and makes good yields on this and related soils.

Under good management, such as the use of cover crops, stripcropping, terracing on some sites, and adequate fertilization, this soil is responsive and can be kept productive. Measures needed to conserve this soil are more exacting than those for the smoother Dewey soils.

Dewey silty clay loam, eroded hilly phase (12 to 20 percent slopes) (DH).—This hilly soil has a reddish-brown surface layer and a strong-brown subsoil. It differs from Dewey silt loam, undulating phase, in having a heavier surface texture and a greater slope. It is closely associated with other Dewey soils and with the Decatur and Talbott soils. The parent materials of this and other sloping phases of Dewey soils show some influence from shale, highly cherty limestone, or both.

The external drainage is rapid to excessive, and internal drainage is moderate. Erosion has worn away from 50 to 75 percent of the original surface soil. The plow layer consists largely of a mixture of the upper subsoil with the original surface soil. The natural cover consisted largely of hardwoods, but old-field pines are common on cutover areas or in old fields that have reverted to forests. A major part of this soil is within the Decatur-Waynesboro-Cumberland-Etowah soil association.

Use and management.—All of this soil was once cultivated, but erosion has lowered productivity to such extent that most of the land is now idle, in pasture, or has reverted to timber. The soil is best suited to pasture or forest. A few acres are in cotton, corn, and lespedeza hay, but yields are low.

If this strongly sloping soil is to be restored, a permanent cover of pasture sod or other close-growing crops should be used to control erosion and supply organic matter. The soil is well suited to kudzu, and if properly limed, seeded, and fertilized, lespedeza, hop clover, Dallisgrass, and Johnsongrass make fair crops.

Dewey cherty silt loam, undulating phase (2 to 6 percent slopes) (DD).—A grayish-brown to weak-brown friable cherty surface layer characterizes this soil. The subsoil is a brown to reddish-brown friable cherty silty clay. The underlying material is usually a highly cherty clay to silty clay. The soil has moderate surface and internal drainage. It has lost less than 50 percent of its original surface layer; the loss possibly ranges between 30 and 35 percent.

The major part of this soil is in the vicinity of Trinity in the redlands and alluvial plains. It is closely associated with Decatur, Talbott, and other Dewey soils of the area. The forested land is covered with hardwoods, though some pine grows on the cutover or idle areas, and there are a few cedars.

The profile characteristics are much the same as those of Dewey silt loam, undulating phase, except that chert fragments are scattered throughout. The fragments, from ¼ to 3 inches or more in diameter, are so numerous that they interfere with cultivation in most places.

Use and management.—Most of this soil has been cleared and is now used for crops and pasture, to which it is well suited. It is fairly productive and workable and has a capacity for holding moisture available to plants. Its inherent fertility is not so good as that of Dewey silt loam, undulating phase. If tilled crops or small grains are needed, however, the soil will produce fairly satisfactory yields. It responds to heavy applications of fertilizer and to growing of winter cover crops but, because of its chertiness, it is best used for pasture.

Cotton, corn, small grains, and some hay are grown. Lespedeza and alfalfa are generally not grown, because the chert fragments interfere with harvesting.

Dewey cherty silty clay loam, eroded undulating phase (2 to 6 percent slopes) (DF).—This soil is similar to Dewey cherty silt loam, undulating phase, in all characteristics except color and texture of the surface layer. It has lost from 50 to 75 percent of its original surface. Much of the subsurface layer or upper part of the subsoil has been mixed with the top layer. Because of this admixture, the surface layer has changed from a weak brown to reddish brown and is heavier in texture.

This soil is closely associated with the other cherty phases of the Dewey soils and with the Decatur and Talbott soils; a large part is located near Trinity. The native vegetation is chiefly hardwoods, but some pines grow on idle or cutover land.

Use and management.—This eroded undulating phase is similar to the undulating phase in use suitability, but its inherent fertility is

not so great as that of some of the noncherty phases of the Dewey series. It is fairly well suited to most crops commonly grown and to pasture.

All of this soil has been cleared and used for crops and pasture. The important crops are cotton and corn, though small grains and hay are grown to some extent and some areas are used for pasture. With proper terracing, growth of legumes, and moderately high applications of fertilizer, this soil produces fairly good crop yields. A good pasture sod or close-growing crops, such as hay and small grain, may serve to hold erosion in check. Where it becomes necessary to grow row crops, good response may be had from winter legumes used as cover crops. In some places, contour plowing or terracing may be necessary.

Dewey cherty silty clay loam, eroded rolling phase (6 to 12 percent slopes) (De).—This soil occupies stronger slopes than Dewey cherty silty clay loam, eroded undulating phase. Most of the soil has lost more than 50 percent but less than 75 percent of its virgin surface soil. In a few small areas more than 75 percent of the original surface layer has been lost by erosion, and in some places less than 50 percent.

Surface drainage is rapid to moderately excessive, and internal drainage is moderate. The soil is associated with the other cherty phases of the Dewey series and with the Decatur soils.

Use and management.—All of this soil has been cleared at some time and used for crops and pasture grasses. The crop suitabilities and yields are about the same as for Dewey cherty silty clay loam, eroded undulating phase, but this soil requires more exacting management, such as use of winter cover crops, use of close-growing crops in the rotation, contour plowing, stripcropping, and in some instances terracing.

It is only fairly well suited to crops and pasture. The presence of so much chert makes it better suited to pasture than crops. Under good management, pasture grasses will furnish considerable grazing during much of the year.

Dunning silty clay (0 to 2 percent slopes) (Dm).—This alluvial soil is characterized by slow to very slow external drainage and very slow internal drainage. It differs from Melvin silt loam mainly in its darker color, finer texture, and heavier, more compact consistence. It occupies nearly level to slightly depressional first bottoms along lateral drains in the limestone valleys and is frequently overflowed. Probably 80 percent has less than 1 percent slope.

This soil is closely associated with Hollywood, Colbert, Melvin, Lindside, Egam, and Robertsville soils. It resembles Hollywood silty clay in texture and parent materials but differs from it in structure, drainage, color, consistence, and position occupied. Most of this soil is in the Allen-Hollywood-Christian-Atkins soil association and in the Moulton-Cotaco Valley. The original cover consisted of water-loving or water-tolerant hardwoods, with some cedar and holly.

Profile description:

0 to 3 inches, dark olive-brown silty clay; friable when moderately dry but very sticky and plastic when wet; relatively high in organic matter; crumb structure; mildly alkaline.

3 to 7 inches, moderate olive-brown to dark olive-brown heavy plastic clay mottled with light olive brown; about neutral in reaction.

7 to 14 inches, medium olive-gray heavy plastic clay splotched or mottled with light olive brown to rust brown; weak blocky structure when moderately dry; moderately low in organic matter; medium to strongly acid.
14 to 23 inches, weak-olive to pale olive-gray, plastic, sticky clay mottled with rust brown and bluish gray; medium acid.
23 to 36 inches, light olive-gray heavy, plastic, sticky clay mottled with gray, weak yellow, and rust brown; medium to slightly acid.

The soil materials are nearly free from sand and grit. Fast-moving waters may bring in some chert fragments on open or cleared areas that border high-lying Colbert soils or lie close to rough stony slopes. The depth of the dark surface material varies with drainage. In some areas under artificial drainage the dark surface layer may be 8 to 12 inches thick, whereas in very poorly drained areas it may be only 2 to 4 inches thick.

Use and management.—This naturally fertile soil is not suited to field crops because of its heavy texture and high water table. Where open ditches are established, however, they furnish sufficient drainage for permanent pastures. It requires little lime or nitrogen, but the addition of potassium and phosphorus may be beneficial.

Many areas in the county have been drained sufficiently to be used for corn, small grains, lespedeza, and soybeans. These drained areas will produce a low yield of oats and a very low yield of wheat. In very wet seasons, however, both crops may fail.

Egam silty clay loam (0 to 2 percent slopes) (Ea).—This soil occurs along the larger streams where a large part of the material has washed from uplands underlain by high-grade limestone and possibly some shale. It occupies first bottoms in association with Huntington, Lindside, and Melvin soils. The surface is nearly level and subject to periodic overflow. External drainage is slow but adequate, and internal drainage is moderately slow because of the compact, almost impervious subsoil. A very large part of this soil is in the Allen-Hollywood-Christian-Atkins association along the Tennessee River and Flint and Cotaco Creeks. The native vegetation consists largely of oak, maple, gum, beech, hickory, vines, and briers.

Profile description:

0 to 6 inches, brownish-gray silty clay loam; fairly friable when dry, but sticky when wet.
6 to 13 inches, brownish-gray, moderately compact, heavy silty clay loam; weak blocklike structure.
13 to 22 inches, weak-brown very compact silty clay; plastic and sticky when wet; fairly friable under optimum conditions; blocklike structure.
22 to 36 inches, brownish-gray heavy plastic silty clay to clay splotched with brown and some gray; very firm in place.

This soil has a relatively high content of organic matter and is medium to slightly acid. It varies in depth to the compact, rather hard, heavy subsoil.

Use and management.—This soil is productive, although it is somewhat less so than Huntington silt loam. The high clay content and compact subsoil interfere with root penetration and an adequate moisture supply for plants during the drier periods. On the other hand, crops are likely to be damaged by flooding during especially wet periods.

Practically all of this soil is used for crops or pasture; corn and hay are the dominant crops. The soil affords good pasture, except in

very dry periods. Only light applications of fertilizer are used on most fields, and some of the better corn yields are obtained on those areas where manure crops, such as crotalaria, have been turned under, or where deep plowing has been practiced.

Enders loam, undulating phase (2 to 5 percent slopes) (Ee).—This soil occupies upland sandstone plateaus in localities where the influence of acid shale materials is very high. It is located mainly in the southern and southeastern parts of the county. The soil has moderate surface drainage, but it has slow internal drainage because of the heavy subsoil. It occupies relatively smooth tablelands on broad ridges, or divides, and moderately large benchlike flats in slightly lower positions. It is frequently almost surrounded by Stony rough land (Muskingum soil material) or hilly or steep phases of Pottsville shaly silt loam.

The original cover consisted largely of deciduous hardwoods, with some shortleaf and old-field pines. The evergreens are commonly replacing the hardwoods on cutover or abandoned land. Most of this soil has lost 25 to 50 percent of its original surface layer through erosion. Practically all of it is in the Hartsells-Enders-Muskingum soil association.

Profile description:

0 to 1 inch, light brownish-gray loose mellow loam; relatively high in organic-matter content; numerous small sandstone fragments on the surface and in the upper part of this layer; slightly acid.

1 to 13 inches, light yellowish-brown friable very fine sandy loam; crumb to weak nutlike structure; low in organic matter; very strongly acid.

13 to 19 inches, moderate yellowish-brown friable very fine sandy clay to very fine sandy clay loam with some brown and pale-yellow splotches; weak nutlike structure; very strongly acid.

19 to 28 inches, light-brown to dark-orange very fine sandy clay mottled or splotched with gray and strong brown; firm in place; breaks into a nutlike structure under moderate pressure; very strongly acid.

28 to 40 inches, heavy very fine sandy clay; moderately mottled with weak reddish brown, yellow, and gray; nutlike structure.

40 to 52 inches, weak reddish-brown weakly stratified heavy very fine sandy clay splotched or mottled with pale yellow and gray; very firm in place; breaks into a weak nutlike to soft crumblike structure under optimum moisture conditions.

52 to 60 inches, stratified reddish-brown and weak-yellow, with some gray, very fine sandy clay loam; this layer is partially weathered parent material from interbedded sandstone and shale, and it grades into unweathered thinly interbedded sandstone and shale; very strongly acid.

The profile of this soil varies from place to place according to the amount of shale present in the parent material. Occasionally the more heavy slightly compact layer lies only 6 inches below the surface, whereas in other places the distance may be 24 inches. Although the subsoil varies from pale yellow to reddish brown, moderate yellowish brown is the dominant color in this area. The texture of the surface layer varies from very fine sandy loam to light silt loam. The organic matter in the surface layer is rapidly lost when the soil is put in cultivation, so the plow layer becomes a weak yellow.

Use and management. This soil has excellent workability and good moisture relations for plants, but it becomes erodible on slopes of 3 percent or more. This soil is low in natural fertility but very responsive to good management and is fairly well suited to most crops commonly grown.

A large percentage of this soil is cleared and is now used for row crops and hay, although some areas are in pasture. Cotton, corn, and soybean hay are the major crops; lespedeza hay and truck crops are grown to some extent. Other crops such as oats, potatoes, sweetpotatoes, truck crops, strawberries, and orchard fruits are well suited, and yields are generally satisfactory.

Enders loam, undulating phase, is fairly well suited to winter cover crops, especially hairy vetch. Greater use of these legumes would increase the supply of organic matter and nitrogen and aid in erosion control. Practically all of this soil should be terraced soon after it is cleared and put into cultivation.

Enders loam, eroded undulating phase (2 to 5 percent slopes) (Ec).—This soil is similar to Enders loam, undulating phase, in relief, distribution, and parent materials but has a shallower grayish-yellow surface soil. Before clearing, the two soils were identical, but sheet and shallow gully erosion have washed away 50 to 75 percent of the loose friable materials of the surface and subsurface layers.

This soil occurs in relatively small areas. It is associated with other Enders soils and with the Hartsells and Linker soils near Eva, Hulaco, and Center Grove. Most areas have slopes of more than 3 percent. Surface drainage is considerably more rapid than for Enders loam, undulating phase. Internal drainage is medium in the surface soil and upper subsoil but slow in the lower subsoil. Little moisture penetrates the underlying thinly bedded sandstone and shale. Most of this soil is in the Hartsells-Enders-Muskingum association.

Use and management.—Erosion has greatly impaired the workability of this soil and its ability to absorb and hold moisture. It has low natural fertility but will respond to good management and is well suited to most of the commonly grown crops.

All of this soil has been cleared and is used for crops or pasture. Some areas are now idle or have reverted to forest consisting mainly of shortleaf and old-field pines. The dominant crops—cotton, corn, cowpeas, small grains, and lespedeza—normally yield 10 to 30 percent less than on the Enders loam, undulating phase. Winter legumes generally respond well if fertilized with phosphorus or basic slag. This soil responds well to good management, such as the use of cover crops, heavy fertilization, contour plowing, stripcropping; and, in some instances, to properly constructed terraces. Short rotations may be beneficial until the fertility has been built to a fairly high level.

Enders loam, rolling phase (5 to 10 percent slopes) (Ed).—This soil is similar to Enders loam, undulating phase, in profile characteristics but has stronger slopes. It is closely associated with other Enders soils and the Hartsells and Linker soils. The areas are scattered throughout the sandstone plateaus near Center Grove, Hulaco, and Eva. External drainage is moderate under the original cover but usually becomes somewhat rapid to excessive after the land has been cleared and improved for cultivation. Internal drainage is moderately slow to moderate in the surface and subsurface layers but somewhat slow in the lower subsoil. Little of the absorbed moisture penetrates the underlying shale-and-sandstone layer, and considerable seepage water therefrom moves down the slopes during wet seasons. The native vegetation is the same as that on Enders loam, undulating phase.

Use and management.—Only a fairly small acreage of this soil has been cleared and used for crops and pasture, to which it is fairly well suited. Cotton, corn, hay, small grains, fruits, and vegetables do well when properly fertilized and managed. Care should be exercised in preparing seedbeds and in fertilization in order that good pasture sods may be maintained. Yields of most crops range from 5 to 15 percent less than on Enders loam, undulating phase.

Enders loam, eroded rolling phase (5 to 10 percent slopes) (EB).—This soil resembles Enders loam, rolling phase, in slopes and position occupied, and Enders loam, eroded undulating phase, in profile. It is characterized by an eroded surface, rolling slopes, a grayish-yellow surface soil, and a brown to yellowish-brown subsoil mottled with brown, gray, and yellow. It is underlain by partially weathered thinly interbedded shale and sandstone. The soil occupies rounded ridgetops, moderately steep slopes, and rolling tablelands and benches on the sandstone plateaus in the southern and southeastern parts of the county. It is the most extensive of the Enders soils. It is associated with the Hartsells, Linker, Pottsville, and Muskingum soils, and a large part of it is in the Hartsells-Enders-Muskingum soil association.

External drainage is rapid to excessive, and internal drainage is moderately slow to slow because of the somewhat compact subsoil. This soil is very susceptible to erosion, and both sheet and shallow gully erosion have been active. From 50 to 75 percent of the original surface soil and, in some areas, all of the surface layer and a part of the upper subsoil have been lost. The present surface layer consists largely of materials from the upper subsoil mixed with the remaining part of the original surface soil.

Use and management.—The loss of a large part of its friable surface has impaired the tilth, workability, moisture-absorbing and moisture-holding qualities, and the suitability of this soil for growing crops. It is planted to most of the commonly grown crops and pasture, but returns are usually low.

All of this soil has been cleared and used for crops or pasture. Probably 75 percent is used for agricultural purposes, although some areas are idle and others have reverted to forest. Cotton, corn, and hay are the dominant crops. Under ordinary practices crop yields are low, but with heavy applications of commercial fertilizer and the use of both summer and winter legumes, productivity can be increased.

This soil will respond well to cover crops, contour tillage, strip-cropping, and possibly terracing. Some of the more severely eroded areas should be planted to kudzu or some other permanent crop. With normal moisture and proper seeding and fertilization, a longer grazing period can be expected.

Etowah loam, level phase (0 to 2 percent slopes) (EF).—This soil is characterized by its nearly level to very gently sloping relief, its grayish-brown surface soil, and its yellowish-brown to brown subsoil. It occupies more nearly level slopes than Etowah loam, undulating phase, and has somewhat paler profile colors and more mottlings in the lower subsoil—an indication of slower drainage. The parent materials were similar for these two soils, and the original vegetation was the same.

This soil occurs on relatively low but well-drained nearly level stream terraces in the limestone valleys. Most of it has lost from 25 to 50 percent of its original surface layer. Although it is classed as a well-drained soil, both external and internal drainage are a little slower than for Etowah loam, undulating phase. Nevertheless, it is sufficiently drained for production of all crops commonly grown, including alfalfa and truck crops.

This level phase is associated with the other Etowah soils, as well as with Cumberland, Sequatchie, and Capshaw soils.

Use and management.—Etowah loam, level phase, is well suited to crops and pasture. It readily absorbs and holds moisture and is easily tillable; it is also responsive to good management. Conservation problems are negligible.

Nearly all of this productive soil is cleared for crops and pasture. Fertilizer recommendations, crop suitabilities, and crop yields are about the same as for Etowah loam, undulating phase. This soil probably does not need terracing, but winter cover crops would improve tilth, add organic matter to the soil, and maintain high yields.

Etowah loam, undulating phase (2 to 6 percent slopes) (Eg).—This soil of the limestone valley is characterized by its grayish-brown friable surface soil and moderate- to strong-brown friable subsoil. It occupies both undulating and gently sloping positions on well-drained stream terraces. It occurs in association with other members of its own series and with the Cumberland, Capshaw, Sequatchie, Holston, Wolftever, and other soils on the stream terraces in the limestone valleys. The original vegetation was probably deciduous hardwood. Most of this extensive soil is in the Tennessee and Moulton-Cotaco Valleys. Practically all of it is in the Decatur-Waynesboro-Cumberland-Etowah soil asssociation.

Profile description:

0 to 5 inches, brown to grayish-brown mellow friable loam; contains moderate amount of organic matter.
5 to 20 inches, moderate- to strong-brown friable to heavy silt loams; contains some small rounded gravel; soft crumblike structure; relatively low in organic matter.
20 to 31 inches, moderate-brown to strong-brown friable silty clay loam; slightly compact to firm in place; crumb to irregular nutlike structure; contains numerous rust-brown concretions.
31 to 38 inches, moderate-brown to strong-brown silty clay loam splotched with gray and rust brown; moderately compact but friable; contains numerous rust-brown concretions.
38 to 46 inches, moderate-brown silty clay loam to silty clay mottled with rust brown, pale yellow, and gray; compact but moderately friable; contains numerous rust-brown concretions.

This soil is medium to strongly acid in all layers. The thickness of the surface layer varies as a result of erosion, and the subsoil is exposed in a few places. The surface texture varies from a loam to silt loam, although the largest areas of this soil have a loam surface layer. Waterworn pebbles are not numerous on the surface or in the profile.

Use and management.—Practically all of this productive soil has been cleared and is now used for crops and pasture. It is easily worked and presents no serious erosion problems. It has good physical and chemical properties and occurs in fairly large areas, or is so closely associated with other fertile agricultural soils that they may be used as a single unit.

It is well suited to all locally grown crops and pasture. Cotton, corn, small grains, and hay are the major crops. With proper treatment the soil produces good alfalfa. Excellent yields may be expected from sorghum, potatoes, sweetpotatoes, and truck crops. When lime, phosphorus, and potassium are applied in sufficient quantities, permanent pasture grasses will furnish good grazing each year.

The frequent use of close-growing crops in the rotation, stripcropping, and contour tillage will aid in holding erosion to a minimum. Winter legumes respond well on this soil and should have a place in the rotation. For suggested crop rotations, fertilizer applications, rates of seeding, and other information consult county agricultural workers.

Etowah silty clay loam, eroded undulating phase (2 to 6 percent slopes) (EII).—This heavy soil has a brown to reddish-brown surface layer and a moderate-brown to strong-brown subsoil. It differs from Etowah loam, undulating phase, in that 50 to 75 percent or more of its original surface material has been worn away by erosion and the surface layer has become redder and finer textured. The soil occupies undulating to sloping well-drained stream terraces in the limestone valleys. Practically all slopes are greater than 3 or 4 percent.

This soil has more rapid external drainage than Etowah loam, undulating phase, partly because it has stronger slopes but largely because the present surface layer retards absorption of moisture. Internal drainage is moderate.

The areas are small and scattered throughout other members of the Etowah series and Cumberland soils. Much of this soil is in the Decatur-Waynesboro-Cumberland-Etowah association.

Use and management.—Practically all of this soil is cultivated. Cotton, corn, small grains, and pasture are suited, but yields are lower than on Etowah loam, undulating phase. Crop yields are also affected by the care and cultural methods employed. In some places corn follows winter legumes and no commercial fertilizer is used; minor crops are seldom fertilized. The soil is seldom planted to truck crops or home gardens.

The loss of the friable surface layer may be remedied to some extent if the soil is built up with legumes and winter cover crops and erosion is controlled.

Guthrie silt loam (0 to 2 percent slopes) (GA).—This gray poorly drained soil occupies some of the sinkholes and depressions common in areas overlying limestone. It consists of local alluvium washed from soils that developed over limestone. The surface is nearly level or saucer-shaped and has no natural surface drains. Internal drainage is very slow. The areas are waterlogged during winter and spring but during the rest of the year they may be dry and hard for long periods.

This soil is closely associated with Abernathy and Ooltewah silt loams but it is not so well drained. The original vegetation included such water-tolerant deciduous trees as sweetgum, water oak, willow oak, blackgum, and red oak. Very few areas occupy more than 5 or 6 acres and they are mainly within the Decatur-Waynesboro-Cumberland-Etowah and the Decatur-Talbott-Dewey-Robertsville soil associations.

Profile description:

0 to 5 inches, light-gray or medium-gray friable silt loam mottled with yellowish gray and weak yellow; relatively low in organic matter; very strongly acid.
5 to 9 inches, yellowish-gray friable silt loam to heavy silt loam mottled with light gray and weak yellow; very low in organic matter; very strongly acid.
9 to 18 inches, weak-yellow slightly compact silty clay mottled with gray and yellow; weak nutlike structure; strongly to very strongly acid.
18 to 36 inches, dark-gray, heavy, tough, tight clay mottled with moderate olive brown; breaks into irregular blocks when dry; strongly acid.

This soil has a very small supply of plant nutrients and organic matter and not a large amount of lime. The surface layer is permeable and friable, but the lower subsoil is very slowly permeable to moisture and roots. Moisture relations are unfavorable for good crop growth.

Use and management.—This soil is not well suited to crops, because of its poor workability, generally low productivity, and unfavorable moisture relations. Although some areas produce fairly good yields during exceptionally favorable seasons, most areas are probably best used for hay and permanent pasture.

About 75 percent of this soil is cleared, most of which is in hay and pasture. Corn, cotton, alfalfa, truck crops, or small grains are planted on a very small acreage. With proper seeding, drainage, and fertilization, considerable grazing can be developed. Soybeans and annual lespedeza produce fair yields of hay. For advice on seeding and fertilizing of pastures, consult county agricultural workers.

Hanceville fine sandy loam, undulating phase (2 to 5 percent slopes) (Hc).—This smooth to undulating, well-drained, grayish-brown soil is closely associated with the Linker, Hartsells, and Muskingum soils. It occurs on the sandstone plateaus, where it occupies narrow divides or small, relatively level, almost isolated plateaus. Some areas are adjacent to bluff escarpments where both internal drainage and aeration have been exceptionally good for a long time. Those areas located on the relatively broad divides and broad plateaus generally have slopes greater than 3 or 4 percent.

The parent materials were derived from sandstone, or from interbedded sandstone and shale in which sandstone dominated. The original cover consisted largely of deciduous hardwoods and pine, but now dogwood and other trees and shrubs are scattered throughout. Much of this soil is in the Hanceville-Hector-Linker-Barbourville association.

Profile description:

0 to 2 inches, light grayish-brown to pale-brown loose fine sandy loam; moderately high in organic matter.
2 to 6 inches, moderate yellowish-brown loose and friable fine sandy loam; moderately low in organic matter.
6 to 10 inches, pale reddish-brown friable heavy fine sandy loam to fine sandy clay loam; nutlike structure; low in organic matter.
10 to 34 inches, weak reddish-brown to moderate reddish-brown friable fine sandy clay loam to fine sandy clay; soft crumb structure; low in organic matter.
34 to 58 inches, moderate reddish-brown fine sandy clay loam; moderately firm in place but friable; uniform in color and texture.
58 to 66 inches, moderate reddish-brown slightly cemented loamy fine sand streaked or splotched with grayish brown; breaks into single grains under moderate pressure; underlain by partially weathered acid sandstone.

The surface layer is medium acid, and the rest of the profile is strongly to very strongly acid. The depth to partially weathered sandstone or sandstone bedrock varies from 36 to 72 inches.

Use and management.—This soil is one of the most desirable sandy soils in the county for general farm crops. Although low in natural fertility, it is very responsive to good management and has exceptionally good workability and capacity to absorb and hold moisture.

Practically all of this soil has been cleared recently. The chief crops—cotton, corn, small grains, soybeans, lespedeza, and vegetables—do well if properly managed. Some areas are used for pasture. Yields vary according to management. Under good practices, excellent yields of potatoes, sweetpotatoes, sorghum, and garden vegetables can be obtained.

The management practices needed are moderately exacting but would bring a 20 to 30 percent increase in yields. Winter legumes should be included in the crop rotation, and heavier applications of lime, phosphorus, and potassium are desirable. Conservation practices are required for most areas (pl. 4, *B*).

Hanceville fine sandy loam, eroded undulating phase (2 to 5 percent slopes) (HB).—In nearly all respects this soil is much like the undulating phase, but it has lost from 50 to 75 percent of its original surface layer through erosion. More of the subsoil has been incorporated into the plow layer so that the plow layer has a redder color and somewhat poorer workability. Most of this soil occurs on slopes of 4 to 5 percent. The larger areas occur near Talucah and Flint; other areas are scattered throughout the sandstone plateaus.

Use and management.—Even though this eroded undulating phase has lost much of its original surface layer, it is an excellent soil under good management. It is possibly better suited to cotton than to any other locally grown crop.

All of this soil has been cleared and a large part is cultivated. Some areas are in pasture, and others are idle or have reverted to forest. About the same crops are grown on this soil as on the undulating phase, but yields are from 15 to 25 percent lower. By turning under green-manure crops, the yields could be increased. Growing of vetch or other winter cover crops is a suitable way to add organic matter and conserve moisture. Contour plowing, stripcropping, and terracing would also conserve the soil and moisture and thereby increase crop yields.

Hanceville fine sandy loam, eroded rolling phase (5 to 10 percent slopes) (HA).—Except for stronger slopes, this soil is similar to the eroded undulating phase. It has a 3- to 5-inch brown to reddish-brown fine sandy loam surface soil, and a red to reddish-brown friable fine sandy clay subsoil that is exposed in places. It probably has the reddest surface of any soil on the sandstone plateaus because cultivation has exposed the reddish subsoil. Nearly all of this eroded rolling phase has lost from 50 to 75 percent of its surface layer.

A large part of this soil is in the Hanceville-Hector-Linker-Barbourville association. Other areas are scattered throughout the sandstone plateaus.

Use and management.—The eroded condition of this soil has not seriously impaired its suitability for crops. It is responsive to good management. Under suitable practices it becomes nearly as produc-

A, Caves are common in the county, especially in the Hartselle sandstone along the northern rim of Little Mountain. Many streams flow to subterranean channels through caves of this kind.

B, Part of the low limestone ridges and valleys topographic division.

A, Farm on Dewey silt loam, undulating phase.

B, In its present state, this area of Linker loam, severely eroded rolling phase, is of little value even for pasture.

C, Loblolly pine planted on an abandoned field of eroded Allen soils.

A, Strongly rolling, severely eroded Linker soils. The field has been terraced and prepared for cultivation after being idle for several years.

B, Pasture on Stony smooth land (Talbott and Colbert soil materials).

A, Well-managed mixed pine and hardwood forest north of Taluenh, on Waynesboro fine sandy loam, eroded rolling phase. Land was abandoned for crops about 40 years ago because of severe erosion. Practically all erosion has been checked. Much severely eroded land in this county can be planted to trees.

B, Heavy timber damage caused by late spring fire on recently cutover forest on Hanceville fine sandy loam, undulating phase. Photograph made in midsummer when trees should be in full foliage.

tive as the eroded undulating phase because it has a deep friable subsoil that absorbs and retains moisture. Cotton is generally grown, and yields are fairly satisfactory. Corn, hay, vegetables, and orchard fruits make very good yields if properly fertilized, but establishment of a thick pasture sod is difficult and expensive.

Practically all of this soil is in cultivation each year; a few small areas are rotated between pasture and row crops. Cotton, corn, small grains, soybeans, and lespedeza are grown, and some small areas are in truck crops and orchards.

On the steeper slopes and more eroded spots, kudzu or sericea lespedeza may be the best-suited crop. With proper seeding and fertilizers, permanent pasture will furnish considerable grazing during the year. The rolling slope and erodibility of this soil indicate that a fairly short rotation should be used. Use of close-growing crops and winter cover crops would conserve soil and moisture. Contour tillage, stripcropping, and terracing would be beneficial in many places.

Hanceville loam, severely eroded rolling phase (5 to 10 percent slopes) (HD).—This soil differs from Hanceville fine sandy loam, eroded rolling phase, in having lost more than 75 percent of its original surface layer and, in places, a part of the upper subsoil. The present surface layer, a friable red to reddish-brown loam, consists mainly of material from the upper subsoil. The subsoil is a red to reddish-brown friable fine sandy clay. In many places numerous shallow gullies have cut into the subsoil.

This soil is associated with other members of its own series and with Hector and Muskingum soils near Talucah and Flint. The vegetation consists chiefly of old-field pines, sassafras, and persimmon.

Use and management.—All of this soil has been cleared and used for crops and pasture. A large part is now idle or has reverted to forest. It is fairly easy to till but is very difficult to conserve. The organic-matter content is very low, and the water-holding capacity and moisture-absorbing qualities have been greatly impaired by erosion.

A few areas are planted to row crops, mainly cotton and corn, but the yields are very low. The soil is probably better suited to kudzu, sericea lespedeza, and other close-growing crops. Cultivation and management practices used on other Hanceville soils are suited to this severely eroded rolling phase.

Hartsells fine sandy loam, undulating phase (2 to 5 percent slopes) (HJ).—This is one of the more extensive Hartsells soils. It occurs on the high sandstone plateaus on slopes most favorable for agriculture and for moisture absorption, moisture retention, and aeration. The residual parent materials are from sandstone or acid shale interbedded with sandstone.

External drainage is moderate; internal drainage is usually moderate but may be slightly excessive in areas where the subsoil is lighter and more porous than typical. Erosion control is not difficult but should be started as soon as the soil is placed in cultivation because it is slightly erosive and frequently less than 4 feet deep to bedrock. The native cover consists largely of hardwoods, with some pine, particularly in those areas that have been cut over or abandoned.

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Profile description:

0 to 2 inches, light brownish-gray loose fine sandy loam; contains some organic matter.
2 to 13 inches, light yellowish-brown to dusky yellow friable fine sandy loam; soft crumblike structure.
13 to 26 inches, moderate yellowish-brown to light yellowish-brown fine sandy loam to very fine sandy loam; soft crumblike structure; uniform in color and texture.
26 to 32 inches, light yellowish-brown slightly fine sandy loam; compact or firm in place; contains a few brown sandstone concretions; crushes into a single grain structure.
32 to 46 inches, splotched or mottled gray, pale-yellow, and rust-brown fine sand to loamy fine sand; somewhat compact to firm in place; single-grain structure.
46 to 54 inches, light yellowish-brown weakly loamy sand splotched with gray; slightly firm in place; loose single-grain structure; underlain by partially weathered sandstone or sandstone bedrock.

This soil, like others of its series, varies in depth to bedrock and texture of the parent material. The texture is most typical in the eastern part of the county near Union Hill, Morgan City, and West Point. In these areas the soil was derived chiefly from a medium- to fine-textured sandstone showing little influence from shale. The influence of shale is reflected in the finer textures of both surface soil and subsoil in many of the Hartsells soils in the southern part of the county.

The common depths to bedrock for this soil range from 30 to 60 inches. The soil is medium acid in the surface layer and strongly acid in the subsoil.

Use and management.—This is one of the more desirable soils in the county for general use. It is low in natural fertility but responds to good management. It has excellent workability, and moisture relations are favorable. It is well suited to field, truck, and fruit crops, and to pasture. The dominant field crops are cotton, corn, small grains, and soybeans.

About 75 percent of this soil has been cleared and is used for crops and pasture. Most farmers do not follow any definite rotation system but depend upon commercial fertilizers for plant nutrients. Some, however, do use a summer or winter legume at frequent intervals. Many follow the cotton crop with hairy vetch or Austrian peas before planting corn. Crotalaria, a summer legume, grows well on this soil and will reseed itself; it may be grown along with either cotton or corn.

In addition to cotton and corn, small grains, soybeans, peanuts, and sorghum are grown. Good yields are normally obtained, but fairly heavy fertilizer applications are made unless a cover crop is turned under.

Small basins are generally selected for sorghum, and little or no fertilizer is used. Potatoes and sweetpotatoes produce excellent yields when fertilized, as do beans, strawberries, okra, tomatoes, and many other crops when well fertilized and managed. Alfalfa grown since 1940 on Hartsells soil at the Sand Mountain substation at Crossville in De Kalb County, produced good yields, but sericea lespedeza on the same soil produced as much or more hay per acre at a lower cost.

According to data taken by the Alabama Agricultural Experiment Station at Crossville, the most economical rotation would include a

legume crop to be turned under at least in alternate years. Although this soil is adapted to most crops and lends itself to any type of rotation, the 2- to 3-year rotations are especially well suited. A 2-year rotation of cotton followed by vetch and corn is well liked, as excellent yields of all crops are obtained. A 3-year rotation of cotton followed by a winter legume, corn followed by oats, and soybeans the third year is equally satisfactory. Other 2-year rotations are cotton and peanuts, or peanuts followed by vetch and corn. In another practice corn is grown every year and crotalaria is planted at the time of the last cultivation of the corn. The crotalaria will reseed itself for a number of years. The cornstalks and crotalaria should be cut in the fall or early in winter to allow them to decay.

Hartsells fine sandy loam, eroded undulating phase (2 to 5 percent slopes) (HG).—This soil differs from the undulating phase in that the surface layer is somewhat thinner and more yellow. It is closely associated with Enders, Linker, and Hanceville soils and with the other members of its own series. Like other Hartsells soils, it was derived from sandstone materials that are somewhat influenced by shale, especially on the Sand Mountain plateaus. Both the external and internal drainage are moderate, but the external drainage may be somewhat rapid on unprotected areas. The original vegetation was chiefly hardwoods with some pine. Most of this soil is in the Hartsells-Enders-Muskingum association.

Use and management.—This important agricultural soil has lost from 50 to 75 percent of its original surface layer through erosion. It absorbs and holds moisture and is easily worked and conserved. It is responsive to good management and can be made highly productive for a wide variety of crops common to the area. Yields are generally fair to good.

All of this soil is cleared. Probably 95 percent is used for crops and pasture; the rest is idle or has reverted to forest, chiefly old-field pines. The crops, rotations, and rates of fertilization are practically the same as those used on uneroded Hartsells fine sandy loam, undulating phase, but the yields are probably 5 to 15 percent lower. In order to add more organic matter to the soil, improve tilth, check erosion, and keep the soil productive, cover crops should be used frequently and the soil should be cultivated on the contour or terraced.

Hartsells fine sandy loam, rolling phase (5 to 10 percent slopes) (HH).—The difference between this soil and the undulating phase is in its stronger slopes, which give it a slightly thinner surface layer and more rapid runoff. About one-third of this soil has lost nearly 50 percent of its original surface layer. Drainage is moderate on the surface and internally, although surface runoff may become somewhat rapid on unprotected areas. This soil is associated with the other members of its own series, and with Hanceville, Linker, Enders, and Muskingum soils. It is rather widely scattered throughout the high sandstone plateaus of the county.

Use and management.—This soil is well suited to crops and pasture, although yields are about 10 percent lower than on the undulating phase. Like the other Hartsells soils, it is easily worked and conserved and is very responsive to good management. All commonly grown crops can be grown, but fairly heavy fertilization and good

management are required if high yields are to be maintained. Because of its slope, care should be exercised to conserve the soil by planting winter and summer cover crops or by using terraces where needed. About 30 percent of this soil has been cleared for crops and pasture.

Hartsells fine sandy loam, eroded rolling phase (5 to 10 percent slopes) (HE).—This soil differs from the Hartsells fine sandy loam, undulating phase, chiefly in steepness of slope and in color of the surface layer. Erosion has removed part of the original brownish-gray surface layer, and tillage has mixed some of the lighter colored subsurface layer with the rest to form a lighter colored plow layer. The thickness of the soil over bedrock is probably a little less than for the undulating phase. Workability and conservability are good, but productivity is medium.

Some of the more extensive areas are in the eastern part of the county and along the southern border. The areas are generally not large but they are numerous in places.

Use and management.—Nearly all of this soil has been cleared and planted to clean-tilled crops for several years. Cotton, corn, oats, sorghum, annual hays, fruits, and vegetables do well when properly fertilized and managed.

Erosion is one of the chief problems. Winter legumes and summer manure crops would help to restore organic matter which, in turn, would improve the workability, moisture-holding capacity, and productivity of the soil. Short rotations, frequent use of close-growing crops, contour tillage, stripcropping and, in many places, terracing tend to conserve and improve this soil. Heavy applications of high-grade fertilizers give good crop returns. Heavy liming and fertilization are necessary to establish and maintain a good pasture sod, but even under the best management, pastures on this soil likely will not produce high yields until more suitable pasture crops or better fertilization methods are found.

Hartsells fine sandy loam, undulating shallow phase (2 to 5 percent slopes) (HK).—The chief difference between this soil and Hartsells fine sandy loam, undulating phase, is that bedrock is much nearer the surface in this phase. Bedrock ranges from 12 to about 30 inches below the surface but averages somewhere between 18 to 24 inches. This soil is closely associated with the Muskingum soils and with the other Hartsells soils.

Use and management.—This soil is less suited to crops and pasture than Hartsells fine sandy loam, undulating phase. Although all crops common in the area can be grown on this soil, many are damaged by lack of moisture during summer and early in fall because the soil is shallow to bedrock. Spring crops such as white potatoes, early hay crops, early vegetables, and small grains do well on this soil.

Approximately 75 percent of this soil has been cleared and is used for crops and pasture. The dominant crops are cotton, hay, corn, small grains, sorghum, and potatoes. Some areas are used for growing vegetables, others are used for pasture, and a few remain idle. The fertilizers and crop rotations for this soil are similar to those suggested for the undulating phase, but yields are 25 to 50 percent

lower. The use of winter legumes and terracing to conserve moisture and add organic matter will increase yields.

Hartsells fine sandy loam, rolling shallow phase (5 to 10 percent slopes) (HI).—This soil is similar to Hartsells fine sandy loam, undulating shallow phase, except it has a stronger slope. Under natural vegetation both external and internal drainage are moderate, but when the areas are cleared external drainage may become rapid to somewhat excessive unless precautions are taken to guard against erosion. The soil materials are the same as those of other Hartsells soils, especially of the shallow phases. The depth to sandstone bedrock ranges from 15 to 30 inches at the extremes, but the more common range is 18 to 24 inches. Bedrock outcrops are common. The native cover consists largely of hardwood, but shortleaf pine is common in some areas.

Use and management.—This soil is poorly suited to crops and pasture, but some crops are grown on the lower slopes and many areas are used for pasture. The shallow layer of soil material on sandstone bedrock causes droughtiness; consequently yields of cotton, hay, truck crops, and corn are usually low. During unusually dry seasons crop yields are very low.

About half of this soil has been cleared and is used for crops and pasture. Under favorable moisture conditions and good management, crop yields are fair. When properly terraced and fertilized, permanent pasture grasses furnish fairly good grazing if the moisture supply is favorable.

Where erosion becomes very severe, bedrock may be exposed on rather broad areas.

Hartsells fine sandy loam, eroded rolling shallow phase (5 to 10 percent slopes) (HF).—This soil is similar to Hartsells fine sandy loam, rolling shallow phase, except that it has lost considerably more of its surface soil by erosion and its surface layer therefore contains less organic matter and is more yellowish brown. Its average range in depth to bedrock is 12 to 24 inches, but in many places erosion has cut gullies down to the bedrock. This soil is closely associated with the other members of its series.

Use and management.—A part of this soil has been cleared and is used for crops and pasture, but the yields are very low. The soil has fairly good workability but is too droughty for tilled crops. Kudzu, sericea lespedeza, and similar crops are better suited than crops requiring clean tillage. When well fertilized, seeded, and managed, these perennial crops furnish some hay or considerable grazing for short periods during the year. Because it is eroded, shallow, and strongly sloping, this soil is probably best suited to forest.

Hartsells loam, undulating phase (2 to 5 percent slopes) (HL).—This soil occupies positions and slopes similar to those of Hartsells fine sandy loam, undulating phase, but differs in having a finer textured surface layer and subsoil and a somewhat deeper yellow color. It generally occurs on ridgetops on slopes ranging from 2 to 3 percent. The soil is closely associated with the other Hartsells fine sandy loams and the Enders soils on the Sand Mountain plateaus. It has lost from 25 to 50 percent of its original surface layer through erosion. The native vegetation consists largely of deciduous hardwoods and pines.

Profile description:

0 to 3 inches, light-gray to yellowish-gray loam; contains many roots and much partially decomposed leaf mold.
3 to 8 inches, light yellowish-brown mellow loam; organic-matter content relatively high.
8 to 30 inches, weak-yellow friable loam to light silt loam; organic-matter content relatively low.
30 to 34 inches, weak-yellow silt loam; moderately firm or slightly compact but friable; weakly stained with gray and brown in the lower part.
34 to 44 inches, moderate yellowish-brown silt loam to fine sandy clay loam mottled with gray, yellow, and brown; compact to firm in place but crumbles into a friable mass under pressure.

The depth to interbedded sandstone and shale varies from 3 to 6 feet. The soil is medium to strongly acid in the surface layer but very strongly acid throughout the rest of the profile. In places the surface texture varies from a very fine sandy loam to silt loam. The texture, color, and structure of the subsoil vary from those of the typical Hartsells fine sandy loam profile to those of the Enders loam profile.

Use and management.—This is probably one of the most desirable soils for market vegetables on the Sand Mountain plateaus and is also well suited to field crops.

Practically all of this soil has been cleared and is used for crops and pasture. The principal crops are cotton, corn, soybeans, small grains, and market vegetables. Sericea lespedeza does well if properly seeded and fertilized, and hairy vetch should be included in the rotation. Although low in natural fertility, this soil responds to good management. It has good workability, absorbs and holds moisture, and offers no serious conservation problems. The same management practices apply to this soil as those suggested for Hartsells fine sandy loam, undulating phase, and Enders loam, undulating phase.

Hector fine sandy loam, hilly phase (10 to 20 percent slopes) (Hn).—This soil is mapped in association with Hanceville, Linker, and Muskingum soils and other members of the Hector series. In general, it is a skeletal soil having Hanceville characteristics. It was derived chiefly from residual sandstone, though some interbedded shales are present in the parent rock. The native cover consisted principally of hickory, dogwood, pine, blackgum, and blackjack, white, and post oaks.

Most of this soil is near Talucah and Flint, but other areas are scattered throughout the sandstone regions.

Profile description:

0 to 2 inches, brownish-gray loose fine sandy loam of single grain structure.
2 to 9 inches, moderate yellowish-brown to weak-orange light fine sandy loam.
9 to 16 inches, moderate reddish-brown friable fine sandy clay; contains small sandstone fragments.
16 to 24 inches, strong-brown to dark-orange fine sandy loam to fine sandy clay loam; grades into partially weathered sandstone and in many places lies directly on sandstone bedrock.

The depth to bedrock ranges from 1 to 3 feet but usually averages between 15 and 24 inches. A thin B horizon of fine sandy clay loam occurs in some places.

Use and management.—About one-fourth of this soil has been cleared and is used for crops and pasture. It is not well suited to tilled crops. Yields are generally low, and pastures furnish only

limited grazing. Although this shallow soil has good tilth, it is droughty and hard to conserve. Kudzu grows well and would furnish the most grazing and help to conserve the soil. The areas now uncleared should remain in trees, and forest seedlings should be planted on the open areas.

Hector fine sandy loam, eroded hilly phase (10 to 20 percent slopes) (HM).—This soil differs from the hilly phase in having lost 50 to 75 percent of its original surface materials through erosion. Its surface layer is therefore more reddish brown. A large part of this soil lies within the Hanceville-Hector-Linker-Barbourville association.

Use and management.—Because of its erodibility, shallow plow layer, and steep slopes, this soil is not suited to tilled crops and is only fairly well suited to pasture.

All of this soil has been cleared and was once used for crops and pasture. Although some areas are now pastured, much of the land is idle or has reverted to forest, chiefly old-field pine and scrub oak. Because most of the soil is too steep for terracing, reforestation offers the best use. Kudzu is well suited and would aid in controlling erosion and, at the same time, furnish some grazing for part of the year.

Hector fine sandy loam, severely eroded hilly phase (10 to 20 percent slopes) (HO).—This soil differs from the hilly phase in that more than 75 percent of its original surface materials and much of its subsurface layer have been lost through erosion. Numerous gullies have cut down to bedrock. The red to reddish-brown surface layer is made up of subsurface and subsoil materials. Most of this soil is in the Hanceville-Hector-Linker-Barbourville association.

Use and management.—All of this soil has been cleared and cropped or used for pasture, but about 90 percent has reverted to forest, chiefly pine or a thick growth of sassafras, persimmon, vines, and sedgegrass. About 10 percent is planted to cotton, corn, and pasture, but because of severe runoff, thin surface layer, and strong slopes, the yields of cotton are low and pasture furnishes very little grazing. Under good management this soil is fairly well suited to temporary pasture, particularly kudzu, which also helps to control erosion.

Hector stony fine sandy loam, hilly phase (10 to 20 percent slopes) (HQ).—This stony, brown, friable soil has developed from acid sandstone, somewhat influenced by shale. It is closely associated with the other Hector soils and with the Muskingum, Hanceville, and Linker soils. Internal drainage is rapid, and surface drainage is rapid to excessive.

Practically all of this soil is in the Hanceville-Hector-Linker-Barbourville and the Stony rough land-Pottsville-Hartsells associations. The native cover consists of oak, hickory, and dogwood, although some pine is scattered throughout the wooded areas.

The surface soil is chiefly grayish-brown fine sandy loam; the subsoil is brown to reddish-brown fine sandy loam to loamy fine sand. Sandstone fragments and boulders are scattered over the surface and throughout the profile. The soil material is generally not more than 2 feet deep to bedrock, and in many places only a few inches remain above the rock.

Use and management.—Because of stoniness and strong slope all but the least stony areas of this soil are unfit for tilled crops. The soil is naturally unproductive, and its unfavorable moisture relations make it unsuited to pasture.

All of this soil is in native forest, to which it is best suited. Some temporary range grazing of native grasses, vines, and shrubs may be had during spring.

Hector stony fine sandy loam, eroded hilly phase (10 to 20 percent slopes) (HP).—This soil is similar to Hector stony fine sandy loam, hilly phase, in position, association, parent material, and slope; it differs in having lost from 50 to 75 percent of its original surface layer. A large part of it is in the Hanceville-Hector-Linker-Barbourville and the Stony rough land-Pottsville-Hartsells associations.

The surface soil is a brown to reddish-brown friable fine sandy loam. The subsoil is reddish-brown to red friable fine sandy loam to fine sandy clay loam. Numerous sandstone fragments and some large sandstone boulders are on and in the soil. The soil profile ranges from a few inches to about 2 feet in thickness.

Use and management.—This soil is too steep for tillage. The thin surface layer, eroded condition, and low natural fertility make it poorly suited to pasture.

Practically all of this soil has been cleared, but most of it now is idle or has reverted to forest, chiefly old-field pine, sassafras, and persimmon. Some small areas that contain less stone are planted to corn and cotton, but the yields are too low to justify such use. The soil should be reforested or planted to kudzu. Kudzu will furnish some grazing and aid in soil conservation.

Hector stony fine sandy loam, steep phase (20+ percent slopes) (HR).—This soil differs from Hector stony fine sandy loam, hilly phase, in having stronger slopes and more sandstone boulders on the surface and throughout the thin layer of soil material. This steep, stony soil is closely associated with the other soils of the Hector series and with the stony Muskingum soils.

Use and management.—This soil is too steep and stony to be suited to tilled crops. Forestry is probably its best use.

Some small areas have been cleared and planted to crops and pasture, but they are mainly idle or have reverted to forest consisting chiefly of old-field pine. Kudzu is a pasture crop that would aid in erosion control and supply temporary grazing.

Hollywood silty clay (0 to 6 percent slopes) (HT).—This soil has a dusky-olive to black surface soil and medium olive-gray to light olive-gray subsoil. It consists of materials washed from weathered limestone that contains a large amount of clay. This soil usually occurs at the base of limestone slopes and extends toward the first bottoms or low terraces.

The external drainage is generally slow and, in many places, artificial drainage prevents excess water from standing on the surface, especially following heavy rains. Internal drainage is slow but is ample on those areas where crops are grown.

Hollywood silty clay is very extensive, and a large part of it is in the Allen-Hollywood-Christian-Atkins soil association in the Moulton-

Cotaco Valley. The native cover is largely water-loving hardwoods, but cedar, holly, and some pine occur.

Profile description:

0 to 2 inches, dusky-olive heavy silty clay; blocky structure; strongly plastic when wet; contains some brown concretions.
2 to 12 inches, olive-black heavy tough plastic clay; blocky structure; contains many roots.
12 to 20 inches, medium-gray to olive-gray or dusky-olive heavy tough plastic clay; very sticky and plastic when wet, but hard and tough when dry; blocky structure; contains some brown concretions.
20 to 28 inches, light olive-gray to pale-olive heavy tough clay; contains some irregular rust-brown concretions; massive.
28 to 36 inches, dusky-yellow to light olive-gray heavy tough clay mottled or splotched with rust brown and weak yellow; contains some small irregular concretions.
36 to 48 inches, light olive-gray to dusky-yellow heavy tough clay mottled with rust brown and gray; contains numerous lime nodules ¼ to 1½ inches in diameter.

The depth of the olive-black layer varies from place to place. Variations in surface color and texture occur where materials have been washed from adjoining areas and deposited over the surface. The soil is about neutral to mildly alkaline.

Use and management.—Hollywood silty clay has good workability under optimum moisture conditions, but it becomes heavy, sticky, and plastic during wet periods. It absorbs moisture slowly, but its moisture-holding properties are fairly good. If the soil is worked when wet, it puddles; if worked when too dry, it clods; if worked when moderately dry to moderately wet, however, it breaks into a fine granular mass and forms a good tilth. Erodibility is not serious.

This soil is fertile and productive under favorable moisture conditions, but during extremely wet seasons crop yields may be very low. Most of it has been cultivated; probably less than 5 to 8 percent remains in forest. Corn, small grains, soybeans, and annual lespedeza are major crops. Some areas are used for pastures, which contain lespedeza, Johnsongrass, and Dallisgrass. The soil is well suited to white clover and Kentucky bluegrass, and Johnsongrass will furnish considerable grazing and hay.

Alfalfa dies out after a year or two, but under moderately dry conditions large yields are obtained. Cotton generally makes too much stalk and foliage, and the bolls are injured by frost. Corn may develop disease when planted on Hollywood soils, but a more liberal use of potassium has overcome this condition in some instances. Small grains and hay crops have a tendency to lodge.

Little if any fertilizer is used, but phosphorus and potassium will increase yields of crops and pasture.

Hollywood loam (0 to 2 percent slopes) (Hs).—This soil differs from Hollywood silty clay in having an overwash or mixture of sandy materials in its surface layer. Both surface and internal drainage are slow. The surface layer is generally a dark grayish-brown loam, and the subsoil is an olive-black heavy plastic clay. This soil generally occupies slight depressions at the foot slopes of limestone rocklands or such limestone soils as the Colbert and Talbott. The total acreage is small and is more or less associated with areas of the other Hollywood soil.

Use and management.—About 95 percent of this soil is used for crops and pasture. Hay and corn crops are most commonly grown. Hollywood loam has better workability and tilth than Hollywood silty clay, but the use suitability is about the same for both.

Holston fine sandy loam, level phase (0 to 2 percent slopes) (Hv).—A light brownish-gray to pale grayish-yellow friable fine sandy loam surface layer characterizes this nearly level soil. It is considerably paler and the mottlings are generally somewhat closer to the surface than for Holston fine sandy loam, undulating phase, and it usually occurs on somewhat lower and almost flat terraces. Occasionally, its position is slightly higher, or on a low, nearly level tableland bordered by very gentle slopes. Relief ranges from nearly level to very gently sloping.

External and internal drainage are moderately slow to moderate. The native cover consists largely of hardwoods and pines. In some places, especially on abandoned areas, old-field pine makes up the entire forest. Most of this soil is in the Holston-Monongahela-Tyler-Tupelo association.

Use and management.—About 75 to 80 percent of this soil has been cleared for cultivated crops and pasture, to which it is well suited. It has good workability and moisture-absorbing qualities and requires little special management for soil conservation. Although low in natural fertility, it is very responsive to good management. The most common crops are cotton, corn, small grains, and hay. Potatoes, sweetpotatoes, sorghum, and garden vegetables are also grown to some extent. Some areas are used for both improved and unimproved pasture.

Holston fine sandy loam, undulating phase (2 to 6 percent slopes) (Hw).—This soil has a light brownish-gray to grayish-yellow plow layer and a yellow to bright-yellow permeable subsoil. It occupies old stream terraces consisting of material derived largely from sandstone influenced by materials from shale and weathered limestone. The surface is smooth, and internal drainage is moderate. This is the most extensive of the Holston soils in the area. Many of the individual areas are large, especially near Austinville, but smaller, irregular areas are scattered throughout the Tennessee and Moulton-Cotaco Valleys. Most of the soil is in the Holston-Monongahela-Tyler-Tupelo association. The native cover consists largely of hardwoods, with some pine. Old-field pine is common on land that has reverted to forest.

Profile description:

0 to 1 inch, brownish-gray loose fine sandy loam; contains some organic matter.
1 to 12 inches, light brownish-gray to pale grayish-yellow friable fine sandy to very fine sandy loam; slightly stained with organic matter.
12 to 28 inches, grayish-yellow very fine sandy loam to light fine sandy clay loam; mellow and friable.
28 to 34 inches, yellow to bright yellow very fine sandy clay splotched or faintly mottled wth rust brown, gray, and red; moderately compact but friable.
34 to 72 inches, yellow, very fine sandy clay mottled with gray and rust brown; moderately compact to firm in place, but friable; the gray mottlings increase with depth.

This soil is strongly to very strongly acid and has low supplies of plant nutrients and organic matter. It is permeable to roots and has good

ability to hold moisture for plants. Some areas have lost a part of the surface layer by erosion, and in others some subsoil is included in the plow layer. Those areas that have a few pieces of gravel on the surface and throughout the profile are indicated on the soil map by the appropriate symbol.

Use and management.—This soil is well suited to tilled crops and pasture. It is easy to work except for local spots where gravel is abundant. Erosion can be controlled under proper management, although the more sloping parts require terraces and cultivation on the contour. Its productivity is moderately low, and constant care is required to keep it at a high level of fertility. The soil is very responsive to good management, however.

Nearly all of this soil has been cleared for crops and pasture. Cotton, corn, small grains, and hay are most frequently grown, and sorghum, potatoes, sweetpotatoes and home gardens are common. Some areas are used for pasture.

Holston fine sandy loam, eroded undulating phase (2 to 6 percent slopes) (Hu).—Although this soil is otherwise similar to Holston fine sandy loam, undulating phase, it has lost from 50 to 75 percent of its original surface layer by erosion. The surface color ranges from a light brownish gray to a yellowish gray, and in some spots the yellow subsoil is exposed.

The soil is closely associated with other Holston soils and with the Sequatchie, Monongahela, and Tyler. A large part is in the vicinity of Austinville and in the Holston-Monongahela-Tyler-Tupelo soil association. The original cover was mainly deciduous hardwoods mixed with pine. On idle or cutover land the vegetation is dominantly old-field pine. The soil profile is strongly to very strongly acid.

Use and management.—Although this phase has lost much of the surface layer by erosion, it is workable and has good moisture-absorbing qualities. It is easy to conserve, although many areas should be cultivated on the contour. The soil is low in fertility but responds to good management. Most crops common to the area grow well when properly fertilized and cultivated.

All of this soil has been cleared and is used for crops and pasture. Cotton, corn, small grains, and hay are the dominant crops. The major hay crops are soybeans and annual lespedeza; some land is in truck crops and pasture. Under ordinary practices yields are moderately low, but with heavy applications of fertilizer, the use of winter legumes, and proper crop rotation, yields are good. Sorghum and truck crops produce satisfactorily under proper management. To improve tilth and increase yields, crops should be rotated in such a manner that winter and summer legumes are included.

Holston gravelly fine sandy loam, undulating phase (2 to 6 percent slopes) (HA).—This soil has a gray to brownish-gray surface soil, yellow to light yellowish-brown friable subsoil, and waterworn quartz gravel on the surface and in the profile. It occupies high terraces and is associated with gravelly phases of the Nolichucky soils and with Tilsit and Linker soils. It is similar to Holston fine sandy loam, undulating phase, in color and consistence of the profile, although in many spots it is heavier and more brown in the lower subsoil. This old river-terrace material, which ranges from a few inches to more than

8 feet in depth, is underlain by the sandstone formation from which the Tilsit and similar associated soils have developed. Both surface and internal drainage are moderate, although the internal drainage is slower in areas having the heavy plastic subsoil.

A large part of this soil is in the Nolichucky-Tilsit-Holston (gravelly) association. The native vegetation consists largely of oak, pine, hickory, gum, poplar, and dogwood.

Profile description:

0 to 2 inches, medium-gray to light brownish-gray moderately loose fine sandy loam; waterworn quartz gravel from ¼ to 3 inches in diameter are numerous on the surface and throughout the profile; contains moderate amounts of organic matter.
2 to 15 inches, weak-yellow to yellowish-gray friable fine sandy loam; soft crumblike structure; moderately low in organic matter.
15 to 30 inches, light yellowish-brown to moderate-yellow friable fine sandy clay loam faintly splotched with brown and pale yellow in lower part; weak nut to soft crumb structure.
30 to 36 inches, light yellowish-brown fine sandy clay loam splotched or mottled with rust brown and gray; moderately compact to firm in place, but friable; nut structure.
36 to 44 inches, silty clay intensely mottled with red, gray, and pale yellow; somewhat sticky and plastic when wet, firm when dry.
44 to 60 inches, heavy tough plastic clay intensely mottled with red, gray, and weak yellow.

The chief variations are the depth of the deposited river-terrace materials, the quantity of waterworn quartz gravel, and the presence and depth to the heavy tough clay subsoil. Some areas have occasional pieces of gravel, whereas in other spots gravel interferes with cultivation. The heavy clay subsoil varies from 2 to 6 feet from the surface. The soil is strongly acid and low in organic matter.

Use and management.—This soil has favorable moisture relations and is well suited to all crops commonly grown. Although low in natural fertility, it is very responsive to good management. Its smooth surface and good tilth make this soil easy to work except where gravel is abundant. It is easy to conserve under proper management, although the more sloping parts require special care.

About half of this soil has been cleared and cropped. Cotton and corn are dominant. Some small grains and hay crops are grown, particularly soybeans and sericea lespedeza. Moderately short rotations are common, and light to moderately heavy applications of fertilizer are used, mainly for cotton and corn.

Holston gravelly fine sandy loam, eroded undulating phase (2 to 6 percent slopes) (Hy).—Erosion has worn away 50 to 75 percent of the surface layer of this soil; otherwise it is similar to Holston gravelly fine sandy loam, undulating phase. It is limited in extent, low in organic matter, and strongly acid. The surface layer is yellowish gray, and the friable subsoil is dominantly yellow.

Use and management.—This soil is suited to tilled crops, but its organic-matter content and productivity are relatively low. It responds to amendments, legumes, and other good management. When close-growing crops and winter legumes are used, it is easily worked and suited to all crops commonly grown.

All of this soil has been cleared and improved for growing cotton, corn, small grains, hay, and pasture. Winter legumes should be included in rotations lasting not more than 3 years, and the soil should

be cultivated on the contour to check erosion. Crop yields are 10 to 25 percent lower than on the undulating phase.

Holston gravelly fine sandy loam, rolling phase (6 to 12 percent slopes) (Hz).—This soil has stronger slopes than Holston gravelly fine sandy loam, undulating phase, and erosion is more active. Its drainage is also more rapid so that crops grown on it are damaged more in dry seasons. Most of this soil has been cleared recently or is in forest. The forest cover includes dryland oaks, hickory, a few beech, and in places some shortleaf and loblolly pine.

Use and amangement.—This soil has good workability and conservability and medium productivity. In places, however, the abundant gravel may interfere with tillage, but it also facilitates drainage. The soil is fairly well suited to cotton, corn, hay, small grains, and pasture.

A 2- or 3-year rotation of close-growing crops is suited to this soil. Small grains that mature early in spring generally receive enough moisture for their growth, whereas crops maturing late in summer and early in fall, such as corn and hay, may be damaged by lack of moisture. Winter cover crops (vetch and Austrian peas) have produced good results when turned under ahead of corn. Stripcropping, contour plowing, and, in some places, terracing are needed to check erosion. Heavy applications of quickly available high-grade fertilizers are helpful, and other fertilizers, such as nitrate of soda, give good yields when applied as a topdressing. In a few places it may be profitable to remove the larger gravel. Pasture grasses tend to die out on this soil during dry seasons, but the deep-rooted crops such as sericea lespedeza and kudzu may withstand droughts.

Holston gravelly fine sandy loam, eroded rolling phase (6 to 12 percent slopes) (Hx).—This soil is similar to Holston gravelly fine sandy loam, eroded undulating phase, in erodibility and soil profile but it occupies stronger slopes. It has lost from 50 to 75 percent of the original plow layer by erosion, which leaves more gravel on the surface than on the uneroded phases. The original cover was about the same as that on Holston gravelly fine sandy loam, rolling phase.

Use and management.—Although this soil has lost more than half of its original surface, it is workable and absorbs moisture. The productivity is low, but crops respond to amendments and good management. Cotton and small grain do fairly well if properly fertilized, but corn and hay are damaged by lack of moisture during dry seasons.

All of this soil was once cultivated or in pasture, but many areas are now idle or have reverted to forest (largely old-field pine). The frequent use of close-growing crops, winter cover crops, stripcropping, contour plowing, and, in some cases terracing, are beneficial. Crops and rotations are similar to those used on Holston gravelly fine sandy loam, eroded undulating phase, although yields average 10 to 30 percent lower. Yields may be increased by sowing vetch and Austrian peas to be turned under in spring ahead of the corn crop. Heavy applications of quickly available commercial fertilizers are good; many farmers apply from 100 to 200 pounds of nitrate of soda, or its equivalent, per acre as a topdressing. Sericea lespedeza and kudzu withstand the dry seasons better than most pasture or hay crops.

Huntington silt loam (0 to 2 percent slopes) (HC).—This brown, very fertile, well-drained silt loam lies on first bottoms along the

Tennessee River and Cotaco and Flint Creeks. It consists of alluvium derived chiefly from limestone. The soil is very gently undulating to nearly level. All areas, previous to the establishment of Wheeler Lake, were subject to overflow. The system of dams built by the Tennessee Valley Authority has partially controlled stream flow. Internal drainage is moderate to a depth of 30 to 42 inches.

Most of this soil is in the Egam-Lindside-Huntington-Wolftever-Taft association. Practically all areas are associated with Lindside, Melvin, Egam, and Bruno soils of the first bottoms. The original cover was probably moisture-tolerant hardwoods, including oak, maple, hickory, poplar, beech, elm, and walnut, with scattered stands of cedar, pine, and holly.

Profile description:

0 to 1 inch, brown mellow friable silt loam.
1 to 7 inches, brown friable heavy silt loam; weak blocky structure.
7 to 16 inches, brown silty clay loam; slightly compact but friable.
16 to 36 inches, grayish-brown to brown friable silty clay loam; weak blocky structure.
36 to 58 inches, moderate yellowish-brown friable silty clay loom.

The soil is medium to slightly acid and has a relatively high content of organic matter. The color of the surface layer ranges from brown to dark brown or nearly black, and the texture varies from a mellow friable silt loam to a rather heavy, firm, silty clay loam.

Use and management.—Under good management this level soil is well suited to intensive use. It is one of the most productive soils of the county. Because of its good tilth it is easy to work, although moisture interferes with field operations more than on some of the sandier and higher soils. Erosion is not active and plant nutrients are retained well. Many areas occur on fairly broad nearly level fields that can be cultivated by power machinery. Most crops are well suited to this soil, with the exception of cotton and possibly alfalfa.

Practically all of this soil has been cleared and is used for crops and pasture. Corn is the major crop, and many fields are planted year after year. Hay and small grains are also grown. Little fertilizer is used, and lime is not needed for legumes in most areas. Crop yields are high, but better yields can be expected if heavier applications of fertilizer and some rotation of crops are used. Hay and pasture are of good quality and yield heavily. Areas not subject to flooding are probably well suited to all legumes, including alfalfa. Where bluegrass, white clover, and other pasture plants are well established, they supply good grazing during much of the season.

Huntington fine sandy loam, sanded phase (0 to 2 percent slopes) (HB).—This first-bottom soil is similar to Huntington silt loam in color, drainage, and position, but it differs in texture, especially texture of the surface soil. It occurs most commonly in narrow strips near the main stream channels or on first bottoms immediately below sharp curves or bends in the creek or river. The source of soil materials is the same as for Huntington silt loam, but higher percentages of sand, fine sand, and very fine sand are included. External and internal drainage are moderate and slightly more rapid than for Huntington silt loam. The native vegetation consisted largely of deciduous hardwoods, vines, and briers.

This soil is widely distributed throughout the valleys, but the larger areas are along the Tennessee River. It is closely associated with Huntington silt loam, Egam silty clay loam, and Bruno loamy fine sand but differs from the Bruno soil in having less sandy materials in the surface and subsoil. The areas bordering the Tennessee River are highly micaceous. The 5- to 8-inch surface soil is a brown, smooth, fine sandy loam. The subsoil is grayish-brown friable silty clay loam.

Use and management.—The fertile soil has good tilth and workability and good moisture relations. It is therefore well suited to crops and pasture. Corn and hay are the main crops, but small grains are grown to some extent on the higher lying areas.

Practically all of this soil has been cleared and improved for crops and pasture. Crop yields are 5 to 10 percent lower than for Huntington silt loam, although management practices are about the same. Fertilizers are seldom used.

Jefferson fine sandy loam, undulating phase (2 to 6 percent slopes) (JD).—This soil has a brownish-gray friable fine sandy loam surface soil, a light yellowish-brown friable fine sandy clay loam subsoil, and varying amounts of sandstone fragments on the surface and in the profile. It occupies very gentle colluvial slopes at the base of long sandstone slopes and colluvial fans that spread out over the adjacent valley floors. The external drainage is moderate, but may be rapid on the slopes of 4 to 5 percent, especially if the runoff water sweeps in from long, steep, higher lying slopes. The internal drainage is moderate; but on some of the large, nearly level colluvial fans seepage from the high water table makes internal drainage somewhat slow during wet periods.

A large part of this soil is in the Allen-Hollywood-Christian-Atkins association. The original cover consisted largely of hardwoods and pine, with some cedar and holly.

Profile description:

0 to 3 inches, brownish-gray moderately loose fine sandy loam; contains some organic matter.
3 to 16 inches, light yellowish-brown mellow and friable fine sandy loam to fine sandy clay loam; soft crumb structure.
16 to 23 inches, light yellowish-brown fine sandy loam to fine sandy clay; slightly firm in place but friable; some rust-brown concretions in the lower part; breaks into a nut to soft crumb structure.
23 to 37 inches, light yellowish-brown fine sandy clay, splotched with rust brown and gray; compact to firm in place but moderately friable; contains many rust-brown concretions and some sandstone fragments.
37 to 48 inches, mottled gray, rust-brown, and pale-yellow fine sandy loam; compact but moderately friable; contains some rust-brown concretions; breaks into a nut structure under considerable pressure.

The entire soil profile is strongly to very strongly acid. Variations occur mainly in soil texture, the presence of large and small sandstone fragments, and in depth of recent colluvium deposited on the more level areas. The content of rock fragments may be high in places. The texture and consistence of the subsoil vary from a friable fine sandy clay to a rather heavy tough silty clay loam—an indication of some influence from limestone and shale.

Use and management.—This soil is moderately low in plant nutrients, but has fairly good tilth and workability. It absorbs and holds

moisture and is fairly responsive to good management and amendments. It can be made productive of most crops commonly grown.

About 50 to 60 percent of this soil has been cleared for crops and pasture. Cotton, corn, small grains, and hay are the common crops, but sorghum and truck crops are also grown. Most of the soil should be planted to winter cover crops and cultivated on the contour to protect it from erosion, add humus, and increase yields.

Jefferson fine sandy loam, eroded undulating phase (2 to 6 percent slopes) (JB).—This eroded undulating phase differs from the undulating phase in having lost 50 to 75 percent of its original surface layer by erosion. The yellowish-gray plow layer is about 3 to 5 inches thick. Most of this soil lies on the upper slopes. It is closely associated with the Allen, Talbott, and Colbert soils, and with the other members of its own series. A large part is in the Allen-Hollywood-Christian-Atkins soil association.

Use and management.—Although this soil has lost a large part of its surface layer through erosion, it has good workability and absorbs and holds moisture. It is low in organic content and plant nutrients and crop yields therefore are low under ordinary practices. It responds to good management and amendments, however, and cotton, corn, hay, and pasture do fairly well when properly fertilized and managed.

All of this soil has been cleared and used for crops and pasture. Some areas are now idle or have reverted to forest, chiefly old-field pine. Cotton, corn, small grains, and hay are the most common crops, although yields are 15 to 30 percent lower than on the undulating phase. A legume or legumes should be included in the rotations, and close-growing crops would aid in erosion control.

Jefferson fine sandy loam, rolling phase (6 to 12 percent slopes) (JC).—This soil occupies stronger slopes, but soil characteristics, position, source of parent material, and drainage are similar to those of the undulating phase. It is not badly eroded. Although somewhat limited in extent, this soil is found in the Allen-Hollywood-Christian-Atkins association. The native vegetation consists largely of hardwoods, with some pine.

Use and management.—Like the other Jefferson soils, this soil is workable and has other characteristics that make it suitable for crops. It is low in natural plant nutrients but is responsive to good management and amendments.

All of this soil is in original cover. It is well suited to crops and pasture but should be terraced as soon as possible after being cleared. Uses and management and crop yields should be about the same as those for the undulating phase.

Jefferson fine sandy loam, eroded rolling phase (6 to 12 percent slopes) (JA).—This soil is characterized by its grayish-yellow surface soil and light yellowish-brown friable subsoil. Its position and origin of parent materials are similar to those of the undulating phase, but it has lost from 50 to 75 percent of the original surface through erosion. The external drainage is rapid to excessive. The internal drainage is moderately slow, but because of the excessive surface runoff less water penetrates the subsoil. The available soil moisture is

therefore limited during the growing season. A large part is in the Allen-Hollywood-Christian-Atkins soil association.

Use and management.—Practically all of this soil has been cleared and used for crops, but less than 60 percent is now in general farm crops. The rest is in pasture or is idle. Some areas have reverted to forest, chiefly old-field pine. The less sloping areas are fairly well suited to general farm crops. This soil has good workability but is low in plant nutrients and organic matter. Although it is responsive to good management and fertilizers, it is best suited to close-growing or perennial crops.

Cotton, corn, and hay are the major crops; there are some areas of small grains, and orchards are common. Yields are 5 to 15 percent lower than those on the eroded undulating phase.

Rotations should be long and include a winter legume or some close-growing crop. Kudzu and sericea lespedeza can be used for hay and supplemental pasture on the more sloping and eroded areas.

Johnsburg loam (0 to 6 percent slopes) (JE).—This gray to brownish-gray imperfectly drained soil occurs at the base of relatively long slopes and in semidepressions, or nearly level positions, in close association with Tilsit, Enders, and Hartsells soils. The parent material was derived largely from thin interbedded acid sandstone and shale. Considerable seepage comes from the higher lying soils and is partially responsible for the imperfect drainage. Some areas are flooded during heavy rainfall, but only small amounts of materials are deposited.

The larger areas are near Leesdale and Ryan Crossroads; small areas are scattered throughout the sandstone plateaus, especially on Little Mountain. The native cover consists largely of oak, hickory, blackgum, sweetgum, beech, and some old-field pine.

Profile description:

0 to 6 inches, light brownish-gray friable mellow loam; contains some organic matter.
6 to 11 inches, weak-yellow friable silt loam.
11 to 20 inches, weak-yellow to pale-yellow moderately friable silty clay loam mottled with gray and rust brown; contains some rust-brown concretions.
20 to 36 inches, pale-yellow silty clay loam to silty clay mottled with gray and rust brown; moderately compact to firm in place; the gray mottlings and compactness increase with depth.

The soil is very strongly acid throughout. The surface layer varies from a very fine sandy loam to silt loam in places, but loam is the dominant texture. The depth to the mottled subsoil varies from 10 to 18 inches.

Use and management.—This soil is suited to tilled crops, although imperfect drainage and low fertility limit its use. Under good management it is suited to certain hay crops, corn, sorghum, and pasture. It has good workability, fair moisture relations, and is easy to conserve. The soil often remains wet until late in the spring and therefore is not well suited to early crops.

Approximately half of this soil has been cleared and is used for crops and pasture. Lespedeza and soybeans are the common hay crops. Cotton, corn, sorghum, and small grains are grown to some

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extent. Artificial drainage is not generally required for pasture, but where crops are to be grown on the poorly drained areas some method for removing excess water will be needed.

Lickdale silt loam (0 to 6 percent slopes) (LA).—This gray, poorly drained soil occupies some of the sinks and depressions, or stream-heads, common to areas overlying sandstone and shale. In position and drainage it is similar to the Guthrie soil, which is underlain by limestone. The soil consist of colluvium and local alluvium washed from soils developed over sandstone and shale. The soil is nearly level or saucer-shaped, with few drainage outlets; internal drainage is very slow. The areas are waterlogged during winter and spring, but they may be very dry and hard for long periods during the rest of the year.

The original vegetation consisted largely of sweetgum, blackgum, water oak, some pine, and other water-tolerant vegetation. A few areas include more than 5 acres. Most of the land is in the Tilsit-Linker-Cotaco association of soils, although some areas are on the Sand Mountain plateaus.

Profile description:

0 to 2 inches, light brownish-gray friable silt loam; relatively high in organic matter.
2 to 7 inches, yellowish-gray smooth silt loam splotched with light gray; contains a large amount of fine to very fine sand; moderately low in organic matter.
7 to 15 inches, light-gray to whitish-gray silt loam splotched with weak yellow; firm in place but friable; very low in organic matter.
15 to 23 inches, light olive-gray silty clay loam splotched with dusky yellow and light gray; compact to firm in place but moderately friable; weak nut structure.
23 to 36 inches, moderate olive-brown to light brownish-gray heavy silty clay to clay mottled with rust brown, gray, and yellow; compact to firm in place; very slow water penetration.

The soil is very strongly acid and roots seldom penetrate more than 12 to 15 inches. Areas subject to flooding by runoff from cultivated areas often have a light-brown to grayish-brown surface layer a few inches thick. The color of the overwash corresponds to the color of the soil from which it was carried. The soil is very low in plant nutrients, lime, and organic matter, and moisture relations are unfavorable.

Use and management.—About 30 to 40 percent of this soil is cleared; most of it is used for hay and pasture. It is not well suited to crops, particularly corn and sorghum, chiefly because of its poor workability, low fertility, and unfavorable moisture relations. Some areas produce yields during exceptionally favorable seasons, but they are generally low. The quality of the pasture is not high, and the grazing periods are short. Most areas are probably best suited to permanent pasture and hay crops.

Fertilizer, organic matter, and lime would increase yields of crops and pasture. Drainage would be advantageous but is generally impractical because of the very slow permeability of the subsoil and the lack of outlets.

Limestone rockland, rolling (6 to 12 percent slopes) (LB).—Limestone outcrops and fragments are so abundant on this land type that it is almost worthless for agricultural purposes. The areas of soil

intervening between the outcrops are predominantly from the Talbott and Colbert series and occupy less than 10 percent of the surface. About one-third of this land type has a slope of less than 6 percent, and practically all of it is in association with Stony rough land (Muskingum soil material).

Use and management.—This land type is not at all suited to crops and is very poorly suited to pasture because it lacks sufficient material to grow any appreciable grass cover or plants.

A few of the smooth and less stony areas are cleared and furnish a small amount of pasture. The more rolling areas are in irregular stands of hardwoods and cedar.

Limestone rockland, rough (12 to 45 percent slopes) (Lc).—This land type is worthless for crops or pasture because of the numerous limestone outcrops and fragments. The soil material, predominantly Talbott and Colbert soil material, occupies less than 25 percent of the area. Outcrops protrude from 1 to 4 feet above the surface. About two-thirds of this land type has slopes of more than 20 percent, and most of it is associated with Stony rough land (Muskingum soil material).

Use and management.—This land type is not suited to crops or pasture, because it is erodible when cleared and does not have enough soil material to grow plants or grasses. In the few scattered areas where some soil has accumulated, patches have been cleared for pasture. Practically all of the area, however, is covered with hardwoods and cedar.

Lindside silty clay loam (0 to 2 percent slopes) (Ld).—This brown imperfectly drained soil lies on first bottoms in areas developed from high-grade and argillaceous limestone. It consists of materials washed chiefly from Decatur, Dewey, Talbott, Colbert, Cumberland, and associated soils, although some materials from sandstone and shale are included in places. The surface is nearly level and subject to periodic overflow. Internal drainage is slow, and the subsoil is waterlogged during wet periods.

Most of the areas lie as strips along the river and creek bottoms in the limestone valleys and the Moulton-Cotaco Valley. The soil is closely associated with the Huntington, Egam, and Melvin soils; most of the areas are in the Egam-Lindside-Huntington-Wolftever-Taft association. The native cover consists largely of such moisture-tolerant hardwoods as oak, elm, willow, sycamore, and maple.

Profile description:

0 to 8 inches, brown moderately friable silty clay loam.
8 to 15 inches, brown silty clay loam splotched with rust brown and some gray; moderately friable; weakly developed blocky structure.
15 to 18 inches, light-gray to yellowish-gray heavy silty clay loam splotched with rust brown and gray; moderately friable.
18 to 45 inches, mottled yellow and light gray sticky silty clay to clay; gray color increases with depth and the texture becomes heavier.

The soil is slightly to medium acid in the surface layer, and organic matter is relatively high. The subsoil is strongly acid, and the organic matter is low. Some areas along Cotaco and Flint Creeks contain noticeable amounts of sand that have been brought down from tracts of sandstone and shale materials. This soil is permeable to roots and moisture, notwithstanding its low internal drainage. Moisture

relations throughout most of the growing season are favorable, except for alfalfa and certain truck crops, and for small grains in some seasons.

Use and management.—The suitability of this productive soil is limited chiefly to corn and certain hay and pasture plants. The water table is too high for alfalfa; small grains commonly lodge; and excessive moisture is hazardous for truck crops. Some areas in selected positions that have artificial drainage are used for growing cotton. Excessive moisture restricts tillage and other field operations early in the spring; otherwise, this soil is easy to work. Erosion is not generally serious, but areas affected by floods should be protected against loss of the plow layer.

Practically all of this soil has been cleared and is used for crops and pasture. Corn and hay—the main crops—are commonly grown without fertilizers. The quality of the sorghum grown for sirup is not so good as that of sorghum grown on light-colored or sandy soils. This soil is exceptionally well suited to permanent pasture because sods are easy to establish and need only minimum amounts of fertilizer and amendments.

Linker fine sandy loam, undulating phase (2 to 5 percent slopes) (LK).—This soil is characterized by its light brownish-gray surface color and light-brown to moderate reddish-brown subsoil. The surface soil resembles that of the Hartsells soils in color and texture, and the subsoil is similar to that of the Hanceville series. The soil is composed of residuum chiefly from sandstone with some influence of shale in places, especially on the Little Mountain plateau. Both surface and subsoil drainage are moderate. The soil is nearly level to gently undulating. The soil occurs in rather small areas or strips on ridgetops scattered throughout the plateaus of both Sand Mountain and Little Mountain. The native vegetation consists of mixed pine and hardwoods. This soil is closely associated with Hanceville, Hartsells, Tilsit, and Enders soils.

Profile description:

0 to 2 inches, light brownish-gray moderately loose fine sandy loam; organic matter moderate, especially in the top inch.
2 to 7 inches, light yellowish-brown friable fine sandy loam; soft crumb structure; organic matter, relatively low.
7 to 15 inches, moderate yellowish-brown friable fine sandy loam; organic matter, low.
15 to 26 inches, light-brown heavy fine sandy loam; slightly firm in place but friable; breaks into a weak crumb structure when dry and then into a soft crumb structure.
26 to 37 inches, moderate reddish-brown fine sandy clay; slightly compact to firm in place but friable; contains some small sandstone fragments and a few light yellowish-brown splotches.
37 to 48 inches, moderate reddish-brown to pale reddish-brown friable fine sandy loam; material becomes a loamy fine sand near sandstone bedrock.

This soil is very strongly acid throughout and is moderately low in organic matter. Sandstone bedrock occurs from 30 to 60 inches below the surface but is more often at 36 to 48 inches. The surface color ranges from light brownish gray to yellowish brown, depending upon the amount of plow layer that has been lost by erosion. Some measures should be taken to control erosion.

Use and management.—This soil has excellent workability and good moisture-absorbing and moisture-holding qualities. Although com-

paratively low in natural plant nutrients, it is very responsive to good management and to the use of amendments. It is well suited to a wide variety of crops and is easily worked and moderately easily conserved.

Practically all of this soil has been cleared and improved for crops and pasture. Cotton, corn, small grains, hay, and market vegetables are the major crops, although some areas are used for pasture, orchards, and home gardens. Short rotations of cotton and corn are commonly used. Sometimes cotton is followed by a winter legume and then by another crop of corn. A better but longer rotation consists of cotton followed by a winter legume, corn followed by small grain cut for hay, and again cotton. Commercial fertilizers are used to increase crop and pasture yields. Potatoes, sweetpotatoes, other truck crops, sorghum, and alfalfa make very satisfactory yields under good management.

Linker fine sandy loam, eroded undulating phase (2 to 5 percent slopes) (LG).—This soil differs from the undulating phase in having lost from 50 to 75 percent of its original surface layer, and its surface color consequently is more a light yellowish brown than light brownish gray. Both external and internal drainage are moderate. External drainage may be moderately rapid on the stronger slopes. The soil occupies fairly small areas or narrow strips along ridgetops or on gentle slopes. The original cover was probably a mixed stand of pine and hardwood trees.

Use and management.—All of this soil has been cleared and used for crops and pasture. It is workable and has good moisture-absorbing and fair moisture-holding qualities. It is low in plant nutrients but very responsive to amendments and good management and is well suited to all crops commonly grown and to pasture grasses.

Cotton, corn, small grains, and hay are the dominant crops, although market vegetables, orchard fruits, and similar crops are common. Crop yields are usually 5 to 15 percent less than those on the uneroded phase, but fertilizer applications are about the same. Longer crop rotations and more exacting soil conservation practices should be used. If properly seeded, limed, and fertilized, permanent pastures will furnish considerable grazing during much of the year.

Linker fine sandy loam, rolling phase (5 to 10 percent slopes) (LH).—This soil is similar to the undulating phases except it has stronger slopes. It is associated with the Hanceville, Hartselle, Tilsit, and Enders soils, and with other members of its own series. The surface drainage under native forest is moderate but it becomes rapid to excessive when the soil is cleared and unprotected. The internal drainage is moderate. The native vegetation consists largely of pines and deciduous hardwoods.

Use and management.—Probably not more than 25 percent of this soil has been cleared and improved for tilled crops and pasture. It is easy to work but moderately difficult to conserve. The supply of organic matter, lime, and mineral plant nutrients is relatively low, but this soil is responsive to amendments and good management. Cotton, corn, small grains, truck crops, and hay—the major crops—will do well if carefully managed. Pasture plants and legumes will yield satisfactorily if supplied with lime, phosphorus, and potassium. Some areas are used for sorghum and orchards.

Crop yields and fertilizers used are similar to those for the undulating phase. Relatively long crop rotations that include legumes and close-growing crops are suitable. Erosion control should be started as soon as this soil is cleared.

Linker fine sandy loam, eroded rolling phase (5 to 10 percent slopes) (LF).—This soil differs from the undulating phase in having stronger slopes and in being more eroded. It is on the sandstone plateaus and includes residuum, predominantly from sandstone, intermixed with thinly interbedded shale. The surface is gently rolling to rolling, and internal drainage is moderate. On the stronger slopes external drainage may be rapid to excessive. Most of this soil is in the Hanceville-Hector-Linker Barbourville soil association. Other areas are scattered throughout the sandstone plateaus. The original forest cover was predominantly hardwoods and pines.

Use and management.—Practically all of this soil has been cleared and is now used for crops or pasture, to which it is well suited. Some areas are idle or have reverted to old-field pine. Short crop rotations are practiced on most areas, and fertilizers are used at times. Yields are generally lower than those on the undulating phase.

Because of its strong slope and eroded condition, this soil is more difficult to work and conserve than the undulating phase, and it requires longer rotations. Close-growing vegetative cover, such as cover crops, hay, and pasture, should be kept on this eroded soil most of the time. Sericea lespedeza and kudzu are suitable for pasture and hay, and on the strongest slopes and most eroded areas they should furnish grazing during dry seasons when grasses do not grow.

Linker fine sandy loam, eroded hilly phase (10 to 20 percent slopes) (LE).—This soil differs from the eroded rolling phase chiefly in having stronger slopes and in being slightly shallower over bedrock in most places. This soil lies on sandstone plateaus and has formed from residual sandstone mixed with thinly interbedded shale. The hilly slopes promote rapid external drainage, which becomes very rapid on some of the steeper slopes. Internal drainage is moderate. The large areas of this soil are west of Flint; other areas are scattered over the sandstone plateaus. The areas are small in most places.

Use and management.—The strong slopes make this soil unsuitable for clean-tilled crops, although much of it has been cleared and planted. Many eroded areas have been abandoned and have now grown to brush, briers, and weeds, and occasionally to pine forest. Close-growing crops, such as small grains, hay, and pasture, can be grown on the milder slopes if the need is urgent. The steeper slopes are better suited to forest than to farm crops.

Linker loam, severely eroded rolling phase (5 to 10 percent slopes) (LL).—This soil is more eroded than Linker fine sandy loam, eroded rolling phase. Practically all of the surface soil and, in places, part of the subsoil have been lost. Many gullies range up to 2 feet or more in depth. The plow layer, predominantly yellowish-brown to reddish-brown friable loamy sand, differs but little from the underlying subsoil. Practically all of this soil is associated with the other members of the Linker series on Sand Mountain and Little Mountain.

Use and management.—The moderately strong slope and the eroded condition of the soil limit its use (pl. 2, *B*). The organic-matter con-

tent and fertility of the plow layer are much lower and moisture relations are not so favorable as on the less eroded Linker soils. This soil is better suited to perennial crops, such as kudzu and sericea lespedeza, than to annual crops.

All of this soil was once cleared and cultivated. About 50 percent is now idle or reforested, and the rest is in row crops, hay, and pasture. Yields are generally low but vary according to the kind of management given. Factors limiting increased yields are the low capacity of this soil to absorb moisture and a lack of organic matter in the plow layer. Manure and crops such as sericea lespedeza and kudzu are of particular value in counteracting this condition. Relatively long rotations that consist chiefly of close-growing crops are desirable, and tillage should be kept to a minimum. All the soil should be cultivated on the contour; stripcropping, wherever feasible, is beneficial (pl. 3, *A*).

Melvin silt loam (0 to 2 percent slopes) (MA).—This poorly drained soil lies on first bottoms where materials were washed principally from areas developed over limestone, chiefly from Colbert, Talbott, Decatur, Dewey, and associated soils. A few areas are influenced by wash from soils underlain by fine-grained sandstone and shale. Much of this soil occupies slight depressions on lowlands of the nearly level river and creek bottoms that are subject to periodic overflow. Internal drainage is very slow, and during wet periods the entire soil is waterlogged and may have water standing on it. Some fairly large areas are along the Tennessee River and Cotaco and Flint Creeks. Most of this soil is in the Egam-Lindside-Huntington-Wolftever-Taft and Allen-Hollywood-Christian-Atkins soil assocations. The natural forest includes such water-tolerant trees as maple, elm, sweetgum, blackgum, poplar, sycamore, and willow.

Profile description:

0 to 2 inches, brownish-gray friable silt loam; contains much organic matter.
2 to 8 inches, light brownish-gray friable silty clay loam splotched with gray and rust brown.
8 to 20 inches, medium-gray plastic clay loam to clay mottled with rust brown.
20 to 40 inches, medium-gray compact heavy clay mottled with rust brown.

Some areas have a 3- to 6-inch alluvial layer of brown to brownish-gray silt loam. Melvin silt loam is medium to slightly acid, moderate to low in fertility, and low in organic matter. It is slowly permeable to roots and moisture.

Use and management.—About half of this soil has been cleared for pasture and hay. It is poorly suited to tilled crops because it has very slow drainage and its plow layer is hard to work. The moist subsoil supplies water for fair hay crops and fair to good pasture, particularly in summer and fall when upland pastures are usually too dry for grazing. Good pasture probably can be obtained on the wettest soil areas by using artificial drainage. Applications of phosphorus and potassium would improve the drier areas. Fertilization and crop rotations are seldom if ever practiced on Melvin silt loam. If these practices were used together with artificial drainage, corn and certain hay crops could be grown satisfactorily.

Monongahela fine sandy loam (0 to 6 percent slopes) (MB). This soil is recognized by its brownish-gray to gray surface, nearly level

relief, and heavy, tight, compact subsoil. It is closely associated with Tyler, Holston, and Tupelo soils and frequently with the Jefferson, Colbert, Melvin, and Lindside. It occupies nearly level to undulating low terrace positions in the limestone valleys and in small irregular units on low hummocks or flat divides. The individual areas vary from 3 to 25 acres. The relief usually consists of a complex of slopes.

The parent material is alluvial in origin and was derived from a mixture of sandstone, shale, and limestone. Sandstone materials predominate, especially in the surface and subsurface layers. Surface drainage is fair but may be slow in places. The slow internal drainage is brought about by the heavy, compact lower subsoil layer and the very gentle slope. Hardwoods, vines, and underbrush, with some pine and cedar, make up the natural cover. Most of this soil is in the Holston-Monongahela-Tyler-Tupelo association.

Profile description:

0 to 2 inches, light brownish-gray loose fine sandy loam; almost single-grain structure; contains some organic matter and many roots.
2 to 15 inches, yellowish-gray to weak-yellow friable fine sandy loam; relatively low in organic matter; contains some rust-brown splotches and concretions in lower part.
15 to 24 inches, light yellowish-brown fine sandy clay loam mottled with gray, pale yellow, and rust brown; compact to firm in place but moderately friable; contains some brown concretions.
24 to 36 inches, light-gray fine sandy clay loam mottled with rust brown and light yellowish brown; very compact but moderately friable; contains some fine to very fine sand and many rust-brown concretions.
36 to 44 inches, heavy very compact silty clay mottled with moderate yellowish brown, gray, and pale yellow; contains many rust-brown concretions.

The soil is strongly to very strongly acid and comparatively low in organic matter. Erosion is not serious.

Variations are common in this soil. The texture of the surface soil ranges from a very fine sandy loam to loam; and its color, which is usually light gray, may become yellowish or brownish gray in places. The color of the subsoil varies from weak yellow to yellowish brown and from faintly mottled to intensely mottled. Depth to the impervious layer ranges from 12 to 36 inches, but it is found more often at 18 to 30 inches.

Use and management.—Tilth, workability, and moisture absorption are good in the surface and subsurface layers but the tight subsoil restricts internal movement of moisture and air, especially in those areas where the soil is shallow over the compact layer. The soil is low in organic matter and natural fertility. It is responsive to good management and is well suited to most crops locally grown and to pasture.

About 60 percent of this soil has been cleared for crops or pasture. Corn, hay, and small grains are the main crops, although cotton and other crops are grown on the better drained areas. Annual lespedeza and soybeans are the major hay crops. Fertilization is irregular and crop rotations are short. Pastures that have been well fertilized and limed and planted to pasture grasses and legumes will furnish some grazing during early spring and in summer. Sorghum, sweetpotatoes, and vegetables make satisfactory yields under good management.

Muskingum fine sandy loam, hilly phase (10 to 20 percent slopes) (MD).—This soil is characterized by its brownish-gray surface soil,

light yellowish-brown subsoil, hilly slopes, and a shallow plow layer. It resembles Hartsells fine sandy loam, rolling shallow phase, but has stronger slopes and thinner profile layers. This soil occurs on nearly every hilly sandstone plateau in the county. It is common on land composed of narrow ridges or broken areas. Nevertheless, many of the more typical areas occur along the drains that penetrate into the broad, flat plateaus. The parent materials are derived mainly from sandstone but may be influenced in places by shale.

The internal drainage of this soil is moderate to rapid, and there is some seepage in wet to moderately wet seasons, especially under forest cover. The native vegetation is predominantly oak, hickory, and gum, with some pine, especially Virginia or scrub pine, in places. Both shortleaf and old-field pines are common in cutover or idle fields. Most of this soil is in the Hartsells-Enders-Muskingum and the Stony rough land-Pottsville-Hartsells associations.

Profile description:

0 to 1½ inches, brownish-gray loose fine sandy loam to loamy fine sand; contains some organic matter.
1½ to 12 inches, light yellowish-brown friable fine sandy loam; uniform in color and texture; contains small sandstone fragments.
12 to 20 inches, light yellowish-brown to pale-yellow light fine sandy loam to loamy fine sand; contains partially weathered sandstone fragments; subsoil rests upon unweathered, gray, fine-grained sandstone.

The soil is strongly to very strongly acid. The quantity of small sandstone fragments varies from place to place. The fragments range from about ¼ to 3 or 4 inches in diameter but are usually less than ½ inch thick. Sandstone boulders outcrop in places. The depth to sandstone bedrock is usually 12 to 20 inches but varies from 12 to 30 inches.

Use and management.—This shallow soil is poorly suited to crops and pasture because of its low fertility and droughtiness. It is difficult to work and conserve, and yields are low. Those areas having greater depth to bedrock may be suitable for grazing if properly fertilized and seeded.

Practically all of this soil is under forest, to which use it is probably best suited. The more favorable areas would probably produce fair to good pasture if phosphorus, potassium, and lime were supplied. Lespedeza and kudzu are among the better suited pasture plants, although other pasture grasses and legumes would grow on the more favorable areas where seepage waters occur near the base of slopes.

Muskingum fine sandy loam, eroded hilly phase (10 to 20 percent slopes) (Mc).—This hilly soil is similar to Muskingum fine sandy loam, hilly phase, except that 50 to 75 percent of its surface layer has been lost through erosion. It occurs in small areas that are well distributed over the sandstone plateaus. Internal drainage is moderate to rapid; external drainage is rapid to excessive. Practically all of this soil is in the Hartsells-Enders-Muskingum and the Stony rough land-Pottsville-Hartsells associations. The original forests were predominantly hardwoods mixed with some pine.

This erodible soil is strongly to very strongly acid and low in plant nutrients and organic matter. It is permeable to plant roots and moisture but has only a fair capacity for holding moisture available to plants.

Use and management.—This soil is very poor for crops and fair to poor for pasture. Because of its shallow depth to bedrock and strong slopes, it is difficult to work and conserve, and it is hard to keep its productivity at a moderately high level. It is best suited to forest unless the need for pasture and cropland is great.

Practically all of this soil has been cleared. About 50 percent has been abandoned to unimproved pasture or forest; 35 percent is used for hay and pasture; and 15 percent for cotton, corn, or other crops. Little fertilization is practiced, and yields are very low. Lime and phosphorus should be applied to those areas to be used for pasture. Kudzu is well suited to this soil and, if properly planted and managed, will furnish some grazing and some protection from erosion.

Muskingum stony fine sandy loam, rolling phase (5 to 10 percent slopes) (Mg).—This soil is rolling and shallow to bedrock. Sandstone outcrops in a few places, and many sandstone fragments are scattered over the surface. The soil has developed over fine-grained sandstone somewhat influenced by acid shale. Internal drainage is moderate to rapid. Most of the soil is within the Hartsells-Enders-Muskingum soil association. The areas are generally small. About one-fourth of the soil has lost 50 to 75 percent of its original surface layer through erosion. Some small areas of the stony phases of the Hector soils are included with this phase. Pine mixed with some oak and hickory made up the original vegetative cover.

The profile is very similar to that of Hartsells fine sandy loam, undulating shallow phase, but each of the respective layers is thinner. The soil is generally less than 18 inches thick.

Use and management.—This soil is poorly suited to crops because of its low fertility and shallow depth to bedrock. It is moderately difficult to work and conserve. Although capable of producing fair pasture, droughtiness limits its carrying capacity, even under good management. Areas that have greater depth to bedrock may afford good grazing if properly fertilized.

Approximately 75 percent of this soil is in forest. The cleared areas are used for corn, cotton, hay, and pasture, but yields are generally very low. The more favorable areas, if limed and fertilized with phosphorus and potassium, can produce fair to good pasture. Near the base of slopes where seepage increases the moisture supply, grasses may grow fairly well. On the drier areas sericea lespedeza and kudzu make better pasture or hay crops, especially during dry seasons.

Muskingum stony fine sandy loam, hilly phase (10 to 20 percent slopes) (Mf).—The material making up this soil is developed over sandstone that, in places, was somewhat influenced by shale. It occupies stronger slopes and probably contains more sandstone fragments and boulders than the rolling phase. The surface layer is only a few inches over bedrock in places, but in some spots may be 2 to 3 feet deep. A large part of this soil is in the Stony rough land-Pottsville-Hartsells association. A mixture of hardwoods and pine made up the natural cover.

Use and management.—Its strong slope, stoniness, shallow depth to bedrock, and low fertility make this soil poorly suited to crops. It is capable of producing some pasture, and those areas where the depth to bedrock is greater than average furnish fairly good grazing.

Practically all of this soil is under forest. Kudzu will probably furnish more grazing than any other crop, if properly planted, fertilized, and managed. Grasses may do fairly well near the base of slopes where seepage water accumulates and where the underlying limestone provides some lime for plants.

Muskingum stony fine sandy loam, eroded hilly phase (10 to 20 percent slopes) (ME).—From 50 to 75 percent or more of the original surface layer has been eroded from this soil; otherwise it is similar to Muskingum stony fine sandy loam, hilly phase. In places numerous shallow gullies have cut down to bedrock. Internal drainage is moderate to rapid; surface drainage is rapid to excessive. The original cover was probably mixed stands of hardwoods and pine. Most of this soil is in the Stony rough land-Pottsville-Hartsells association.

Use and management.—Because of its strong slope, droughtiness, stoniness, shallow plow layer, and low fertility, this soil is poor for crops and only fair for pasture. It is very difficult to work and conserve. Crop yields are very low.

Practically all of this soil has been cleared, but about 80 or 90 percent has been abandoned to unimproved pasture and forest. The rest is in hay or other crops (chiefly corn), but the yields are very low. Little fertilization is practiced. Pasture grasses support grazing for a relatively short period because of the droughtiness of the soil. This soil should be reforested or planted to kudzu, which would furnish considerable grazing and some protection against erosion. Where urgently needed, these areas might be put in pasture and grasses and clovers planted on the lower slopes where seepage water is more plentiful and where limestone provides some lime for plants. Sericea lespedeza and kudzu are promising plants for the higher and more droughty areas.

Muskingum stony fine sandy loam, steep phase (20+ percent slopes) (MH).—This shallow soil is associated with Stony rough land (Muskingum soil material) on the northern slopes of Sand Mountain and Little Mountain. It has developed over sandstone and has many sandstone fragments on the surface and throughout the soil layers. The slopes are steep and sandstone outcroppings are common. Internal drainage is moderate to rapid. Practically all of this soil is in large areas in the Stony rough land-Pottsville-Hartsells association.

Use and management.—Because of droughtiness, steep slope, and stoniness, this soil is not suited to crops and is very poorly suited to pasture. A few areas would furnish some grazing if seeded, limed, fertilized, and planted to legumes and grasses.

Practically all of this steep phase is in cutover forest, to which it is best suited. Where trees are to be planted, pine does particularly well.

Nolichucky fine sandy loam, undulating phase (2 to 6 percent slopes) (NB).—The material parent to this soil has been washed from soils underlain by sandstone and shale and to a small extent by limestone. It occurs on medium to high stream terraces in close association with Waynesboro, Holston, and similar soils. Its surface layer is more gray and the subsoil layer is more yellow in the upper part than corresponding layers in the Waynesboro soils. It differs from Holston in being more red in the subsoil, although Nolichucky and

Holston have similar surface layers. Both surface and internal drainage are moderate. On some areas the slopes are less than 2 percent. From 25 to 50 percent of the original surface layer has been worn away from much of this soil. Most of it occurs in small units near Austinville and Moulton Heights. A few areas of the level phase are included with this undulating phase. The original cover was chiefly hardwoods and pine.

Profile description:

0 to 1 inch, light brownish gray friable fine sandy loam; relatively low in organic matter.
1 to 6 inches, light yellowish-brown friable fine sandy loam to loam; crumb structure; low in organic matter.
6 to 10 inches, moderate yellowish-brown friable fine sandy clay loam; weak nut structure.
10 to 22 inches, pale reddish-brown friable fine sandy clay; weak nut structure.
22 to 44 inches, moderate-red silty clay; firm in place but moderately friable; uniform in color and consistence; nut structure.
44 to 54 inches, moderate-red silty clay; gray and pale yellow splotches increase with depth; moderately firm in place but friable.

The soil is strongly to very strongly acid throughout the entire profile. The chief variations are in the thickness of the yellow upper subsoil layer and the terrace material and in the character of the underlying residual material.

Use and management.—This soil is easy to work and fairly easy to conserve but is low in fertility. It is responsive to good management and amendments. This undulating phase is well suited to crops, early vegetables, and pasture because of its light texture and good internal drainage. Corn, cotton, small grains, soybeans, lespedeza, and truck crops will do well if properly managed.

Practically all of this soil has been improved for crops and pasture. Most areas are used in a short rotation, although cotton is grown in places for several years in succession. In general, fertilization is light; phosphorus and lime are used for some hay and pasture crops and liberal applications are necessary for good pasture.

Organic matter, lime, and a complete fertilizer are needed at regular intervals if high productivity is to be maintained. Summer and winter legumes do well on this soil and should be included in the rotation to supply nitrogen.

Nolichucky fine sandy loam, eroded undulating phase (2 to 6 percent slopes) (NA).—Erosion has worn away from 50 to 75 percent of the original surface of this soil and in some spots the subsoil is exposed. It differs from Nolichucky fine sandy loam, undulating phase, in having a thinner surface layer. Many shallow gullies are present on the stronger slopes, especially in unprotected areas. Internal drainage is moderate, and external drainage becomes moderately rapid on the stronger slopes. The small scattered areas of this soil are limited in extent and occur near Austinville and Moulton Heights west of Decatur. The original cover was probably hardwoods mixed with pine.

Use and management.—This soil has very good workability and good tilth, but is low in natural fertility and organic matter. Moisture-absorbing and moisture-holding qualities are fair to good. It is well suited to all locally grown crops—particularly corn, cotton, and hay, but unless well fertilized and properly managed, the yields are low.

All of this soil was once cleared for crops and pasture. Some areas are now idle or have reverted to forest, chiefly old-field pine. Rotations that include close-growing crops should be used longer on this soil than on the undulating phase, inasmuch as crop yields are from 10 to 25 percent lower under similar management practices. More legumes should be planted and conservation practices should be more strict. Its eroded condition makes this soil only moderately suitable for truck crops and pasture.

Nolichucky gravelly fine sandy loam, eroded undulating phase (2 to 6 percent slopes) (ND). –This soil is similar to Nolichucky gravelly fine sandy loam, rolling phase, in source of parent material and profile characteristics; it differs chiefly in steepness of slope and in having lost from 50 to 75 percent of its original surface layer through erosion. The soil is small in extent and is closely associated with Holston gravelly fine sandy loam, undulating phase, and Tilsit and Linker soils. The original cover was probably a mixture of hardwoods and pine.

Use and management. This soil is low in natural fertility, and crop yields are generally low. Nevertheless, it is responsive to amendments and good management. It is permeable to roots and moisture and is easily worked, but some conservation measures are needed. In order to conserve soil and moisture, winter legumes and summer manure crops would be useful. Long rotations that include legumes would supply organic matter and make the soil more productive.

All of this soil has been cleared for crops and pasture. Cotton, corn, small grains, and hay are the major crops. Some areas are used for improved pasture and home orchards. This soil is well suited to all crops commonly grown but is only fair for pasture.

Nolichucky gravelly fine sandy loam, rolling phase (6 to 12 percent slopes) (NF).—This soil is similar to Nolichucky fine sandy loam, undulating phase, but it occupies high stream terraces. It contains numerous waterworn pieces of quartz gravel and is associated with undulating phases of Tilsit, and Linker soils and with Holston gravelly fine sandy loam. A few small areas occur on slopes of less than 6 percent. Internal drainage is moderate. External drainage is moderate in forested areas but may become rapid on fields that are cleared and left unprotected. Most of this soil is in the Nolichucky-Tilsit-Holston (gravelly) association. The natural cover consists of oak, hickory, other hardwoods, and pine.

Profile description:

0 to 2 inches, medium-gray to dark-gray friable fine sandy loam; relatively high in organic matter.
2 to 9 inches, yellowish-gray friable fine sandy loam; moderately low in organic matter.
9 to 13 inches, light yellowish-brown to moderate yellowish-brown fine sandy loam to fine sandy clay loam; some faint mottlings of gray and strong yellowish brown in the lower part.
13 to 28 inches, moderate-brown to reddish-brown friable fine sandy clay splotched with gray or yellowish gray; moderately firm in place when dry; nut structure.
28 to 52 inches, pale reddish-brown very fine sandy clay to clay; compact to firm in place; contains some splotching of light yellowish brown in the lower part; nut structure.
52 to 66 inches, pale reddish-brown clay to very fine sandy clay mottled with light yellowish brown; compact to firm in place; moderately friable under optimum moisture.

This soil is strongly to very strongly acid throughout the entire profile; the content of organic matter is low.

The soil varies in depth of deposited material, gravel contained, and color of the surface layer. The material deposited by water varies in thickness from less than 1 foot to more than 10 feet. The gravel ranges from a few pebbles scattered on the surface to quantities sufficient to interfere with cultivation. In a few areas the gravelly material is hauled out for road surfacing. The size of the rounded pieces of gravel ranges from less than ¼ to more than 5 inches in diameter, but the usual range is ½ to 2 inches. The surface layer is yellowish brown in eroded areas. The soil generally occupies higher elevations than do the associated Tilsit and Linker soils.

Use and management.—This soil is permeable to roots and moisture. It is fair to good for crops but only fair for pasture. It has fair to good productivity, responds well to good management, is suited to a variety of crops, and is fairly easy to work and conserve.

Practically all of this soil has its original cover, although most of it could be cleared for crops and pasture. It should respond well to amendments and to both winter and summer legumes. Erosion control should be started as soon as this soil is put in cultivation. Under common management, crop yields are rather low, but under good management and comparatively long rotations that include legumes, yields should increase 10 to 25 percent. Unimproved pasture furnishes periodic low-quality grazing, but with applications of lime, phosphorus, and potassium, good-quality pasture grasses can be produced over much of the year.

Nolichucky gravelly fine sandy loam, eroded rolling phase (6 to 12 percent slopes) (Nc).—This soil differs from the rolling phase in having lost more than one-half and probably less than three-fourths of its original surface layer through erosion. Internal drainage is moderate. External drainage may become rapid to excessive on unprotected areas. Areas of this soil are near Valhermoso Springs and north of Somerville.

Use and management.—This soil is very low in organic matter and low in natural fertility. It has good tilth and workability, but runoff causes a lack of moisture in most areas. Cotton, hay, and corn are the dominant crops. Yields are generally low.

All of this soil has been cleared and improved for agriculture. Crops yield 10 to 25 percent less than on the rolling phase. Nevertheless, yields can be increased by fairly heavy applications of commercial fertilizer and the use of winter legumes and long rotations. Pasture furnishes only limited grazing, even under good management.

Nolichucky gravelly fine sandy loam, hilly phase (12 to 20 percent slopes) (Ne).—This soil occupies steeper slopes, is more severely eroded, and contains more gravel than the rolling phase. Nearly half of the areas have lost more than 50 percent of original surface soil, and erosion has worn away practically all of the surface layer in places. Internal drainage is moderate. In unprotected areas external drainage is rapid to excessive. Most of this soil is in the vicinity of Somerville near the breaks of Little Mountain.

Use and management.—This soil is poorly suited to crops or pasture because of droughtiness, hilly slopes, erodibility, and lack of plant nutrients.

About half of this soil remains in original forest, to which it is best suited. The rest has been cleared for crops, mainly corn and cotton, and for pasture. Close-growing crops such as sericea lespedeza and kudzu are suitable for the cleared areas. Much of the open land is idle or is reverting to forest, chiefly old-field pine. Little fertilization is practiced and yields are very low.

Ooltewah silt loam (0 to 2 percent slopes) (OB).—This nearly level, imperfectly drained soil is situated in sinks, depressions, and small streamheads. It is associated with Abernathy and Guthrie soils, which have developed over limestone. It consists of local alluvium washed from adjacent upland soils, chiefly the Decatur, Dewey, and Talbott. The soil areas are nearly level or saucer-shaped. Few have outlets for surface drainage, and internal drainage is slow. The separate areas seldom exceed 10 acres in extent and are scattered throughout the Tennessee and Moulton-Cotaco Valleys. The original cover was probably moisture-tolerant hardwoods.

Profile description:

0 to 7 inches, moderate-brown to weak reddish-brown mellow friable silt loam.
7 to 14 inches, moderate-brown, faintly splotched with gray and rust brown, heavy silt loam or light silty clay loam.
14 to 30 inches, brownish-gray silty clay loam mottled with rust brown; gray color increases with depth; moderately firm in place but friable.

The soil is strongly acid; the organic content is relatively high in the upper part of the profile but low in the lower subsoil layer.

The profile varies in degree of internal drainage, the depth at which mottling starts, and in total depth.

The soil is permeable, but slow internal drainage retards root penetration. The low position of this soil, combined with its slow drainage and ability to hold water, make it good for growing plants late in summer and early in fall.

Use and management.—This soil is well suited to many tilled crops; it is very well adapted to pasture. Its productivity is high for those crops that can tolerate abundant moisture. The workability is good, although this soil holds moisture late in the spring and following heavy rains and is not so easy to cultivate as well-drained soils. The conservability is very good inasmuch as plant nutrients are retained well and runoff is very light. Corn, some hay crops, and many pasture plants are well suited.

Practically all of this soil is used for crops and pasture. About 50 percent is in corn; the rest is in hay and pasture. Little of small grain, cotton, or alfalfa is grown. A few areas are used as permanent pasture, but many more are used for a short rotation consisting of corn and hay. Some fertilizer is applied for corn but little is used for hay. Yields under common management are moderately high, but crops are damaged occasionally by excessive moisture. Yields should increase under heavier fertilizer applications, and on many areas liming will benefit the legumes. Artificial drainage would improve many areas but is not always economically feasible.

Ooltewah fine sandy loam (0 to 2 percent slopes) (OA).—This soil is similar to Ooltewah silt loam in drainage and position occupied. It differs chiefly in the origin of some of the parent material. It

consists of local alluvium washed from adjacent soils, chiefly the Waynesboro, Sequatchie, and Nolichucky. Some material, however, is from closely associated soils underlain by limestone. The surface is nearly level, and very few areas have surface drainage outlets. Internal drainage is slow. In most places the subsoil materials are the same for this soil as for Ooltewah silt loam.

Many of the areas are small; few exceed 15 acres. Most of this soil is scattered throughout the limestone valleys and the Moulton-Cotaco Valley. The original cover was probably moisture-tolerant hardwoods and some pine.

The surface soil is generally brownish-gray to grayish-brown fine sandy loam, 5 to 8 inches thick. The subsurface layer down to about 12 to 15 inches is generally brown to pale reddish brown. In places it has a loam to silt loam texture. The subsoil is usually gray to brownish-gray silty clay loam to clay, mottled with whitish gray and rust brown.

The surface texture ranges from a loose fine sandy loam to a heavy loam. In some places the subsurface layer, down to depths of 10 to 12 inches, may be a friable fine sandy loam. Although this soil is permeable to roots, the lack of surface outlets makes it unsatisfactory for plants requiring good drainage. Because of its smooth relief, ability to hold moisture available to plants, and slow internal drainage, this soil is favorable for growing plants during dry periods.

Use and management.—This soil is exceptionally well suited to pasture and moderately well suited to tilled crops. Its productivity is relatively high for crops that respond to or can tolerate abundant moisture. In spite of slow internal drainage, its workability is good. Conservability is very good because plant nutrients are retained well and runoff is negligible. Corn, certain hay crops, and pasture plants are well suited.

Nearly all of this soil has been cleared; about 50 percent is used for corn and the rest for hay and pasture. Small grains, cotton, and alfalfa are not extensively grown. Most rotations are short and consist of corn followed by hay. Some fertilizer is used for the corn crop but little is used for hay. Under customary management, yields are moderately high but could be increased if more fertilizer were applied. Lime would benefit the legumes. Occasionally, a crop is damaged by excessive moisture.

Pearman loam, undulating phase (2 to 6 percent slopes) (Pc).—This soil has developed from materials weathered chiefly from interbedded sandstone and limestone, but included are small amounts of residuum from shale. The surface and subsurface layers are gray to yellowish-brown friable loam to silt loam. The subsoil is yellow to yellowish-brown compact heavy clay mottled with red, yellow, and gray. Most areas are fairly small and nearly level to undulating. Surface drainage is generally adequate, but internal drainage is slow. The native vegetation consists of hardwoods, with some pine and cedar. Most of this soil is in the Allen-Hollywood-Christian-Atkins association along the southern slope of Little Mountain.

Profile description:

0 to 2 inches, light brownish-gray friable loam; contains some organic matter.

2 to 8 inches, light yellowish-brown mellow friable silt loam; relatively low in organic matter.

8 to 12 inches, moderate yellowish-brown silty clay loam with some small splotches of gray; slightly compact but friable.
12 to 25 inches, moderate yellowish-brown very compact heavy clay mottled in lower part with pale reddish brown and light yellowish brown; blocky to nut structure.
25 to 54 inches, compact heavy clay, mottled with moderate reddish brown, light yellowish brown, and gray; contains occasional rust-brown concretions and small chert fragments; massive structure.
54 to 80 inches, light yellowish-brown heavy clay mottled with reddish brown and gray; contains some rust-brown concretions.

The soil is strongly to very strongly acid and is low to very low in organic matter.

The proportional amount of limestone, sandstone, and shale contributed by the parent material has caused differences in the depth of friable surface and subsurface layers and in the color and consistence of the subsoil and substratum.

About 60 percent of this soil has lost from 25 to 50 percent of its surface layer through erosion. A few small areas occupy slopes of less than 2 percent.

Use and management.—This soil is fairly well suited to tilled crops and pasture. The heavy clay subsoil limits its capacity for holding moisture available to plants. Workability is fair to good, except where the subsoil is mixed in the plow layer. Although the soil is fairly well suited to all locally grown crops and pasture, its productivity is limited by droughtiness, especially in the eroded areas, and by low fertility.

About 60 percent of this soil has been cleared. Cotton, corn, small grains, and hay are the major crops. In general, fertilization is light and rotations are short. Crop yields under common management are not high but can be increased by applying a complete fertilizer and lime and by using legumes to increase the nitrogen supply and to improve the tilth. Runoff should be controlled. Good pasture grasses and plants can be expected where phosphorus, potassium, and lime are applied in substantial quantites and weeds and brush are removed.

Pearman loam, eroded undulating phase (2 to 6 percent slopes) (PB).—This soil has lost from 50 to 75 percent of its original surface layer through erosion. Otherwise it is similar to Pearman loam, undulating phase, in drainage, relief, parent materials, and association with other soils. It is more extensive, however, and the surface layer is thinner and more yellow in color. Practically all of this soil is in the Allen-Hollywood-Christian-Atkins association.

Use and management.—This soil is fairly well suited to crops and pasture. Its productivity is only fair because of its moderately low fertility and somewhat unfavorable moisture-absorbing and moisture-holding qualities. Workability is good except where the subsoil material is included in the plow layer. The soil is fairly well suited to all locally grown crops.

All of this soil has been cleared and is used for tilled crops, hay, and pasture. Crop rotations are generally short—usually cotton followed by corn. Winter legumes are used occasionally. Crop yields ordinarily are not high but can be improved if a complete fertilizer and green-manure crops are used. Contour cultivation and other erosion control should be practiced to decrease loss of runoff. Fairly good pasture can be expected if phosphorus, potassium, and lime are

used in substantial quantities and weeds and brush are eradicated. The carrying capacity is limited, however, by the droughtiness of the soil.

Pearman loam, eroded rolling phase (6 to 12 percent slopes) (PA).—This soil differs from Pearman loam, eroded undulating phase in occupying stronger slopes. Erosion has been so severe on most of this soil that the subsoil material has become mixed with the plow layer. About a third of the acreage has lost from 25 to 50 percent of the surface soil. On the rest, more than 50 percent and probably less than 75 percent has been eroded away.

The soil is less extensive than Pearman loam, eroded undulating phase. Practically all of it is in the Allen-Hollywood-Christian-Atkins association.

Use and management.—This soil is poorly suited to tilled crops and pasture. Its natural productivity is only fair and its workability and conservability are poor to fair. Moisture conditions are so unfavorable that plants are damaged during prolonged dry periods. The less eroded and less sloping areas are suitable for tilled crops grown in a long rotation.

Practically all of this soil was once cleared and used for crops and pasture. Some areas are now idle or have reverted to pine, sassafras, persimmon, and cedar. Cotton, corn, and soybean hay are the dominant crops. Under common management, yields are low, and they cannot be expected to be high even under good management. If properly seeded, fertilized, and limed, fair pasture can be maintained on many areas, although growth is suppressed during droughts. Contour cultivation and use of long crop rotations that include legumes and close-growing plants should be practiced.

Pearman silty clay loam, severely eroded rolling phase (6 to 12 percent slopes) (PD).—This soil differs from Pearman loam, eroded rolling phase, in having lost more surface material through erosion. Most of the acreage has lost more than 75 percent of its original surface layer and, in many places, a part of the upper subsoil. Gullies ranging from a few inches to more than 3 feet deep are fairly common. A few areas occur on slopes of 15 to 20 percent. Because of the heavy nature of the subsoil, external drainage is rapid and internal drainage is slow. Most of this soil is in the Allen-Hollywood-Christian-Atkins association.

Use and management.—This soil is not well suited to crops and not very productive of pasture, because of its poor workability, low moisture absorption, severe erodibility, and strong slopes. The heavy subsoil, together with the rolling surface, makes terracing unprofitable for row crops. Nevertheless, terracing may be practical in most areas for close-growing crops.

A small acreage of this soil is used for cotton, corn, and pasture, but yields are low. Close-growing permanent crops, such as kudzu and probably sericea lespedeza, could be grown. Kudzu is a good temporary grazing crop that also aids in erosion control.

Philo fine sandy loam (0 to 2 percent slopes) (PE).—This yellowish brown imperfectly drained soil lies on first bottoms composed chiefly of materials washed from uplands underlain by sandstone and shale. The areas are nearly level and are periodically overflowed. In-

ternal drainage is slow. Most of this soil is on the standstone plateaus in narrow strips along the small creeks and branches. It is associated with Atkins and Pope soils. The original cover was chiefly moisture-tolerant hardwoods.

Profile descriptions:

0 to 8 inches, light yellowish-brown friable fine sandy loam; has splotches of organic matter in the upper part.
8 to 15 inches, weak-yellow to yellowish-gray friable fine sandy loam, faintly mottled with rust brown and gray.
15 to 24 inches, yellowish-gray to weak-yellow friable heavy fine sandy loam to loam mottled with gray and rust brown; contains some rust-brown concretions.
24 to 36 inches, light-gray to yellowish-gray friable heavy fine sandy loam to loam intensely mottled with gray and rust brown; contains some brown concretions.

The texture of both the surface and subsoil varies from place to place. Surface texture varies from a light fine sandy loam to loam, and the subsoil texture ranges from a fine sandy loam to silty clay loam.

This strongly acid soil is low in plant nutrients and organic matter. It is permeable to roots, but moisture infiltrates slowly and restricts the development of plants that need good drainage. Its ability for holding a fair supply of moisture available to plants, combined with moderately slow internal drainage, makes this soil favorable for growing plants late in summer and early in fall.

Use and management.—This soil is fairly well suited to crops and pasture. Its natural productivity is low, and it is suited only to certain crops. Workability is good, although the soil is wet in spring and during rainy seasons. The conservability is fairly good, but heavy applications of fertilizer are needed.

About 60 percent of this soil has been cleared and is used for corn, hay, and pasture. Some fertilizer is used for corn and hay, and lime may have been applied to certain pastures. The length of rotation varies greatly. Some areas are used for permanent meadow or pasture, whereas others are used intensively for corn or hay. Yields under common management are only fair. The suitability and productivity of this soil can be increased by artificial drainage, but such improvement may not be always feasible.

Philo-Lindside soils, undifferentiated (0 to 2 percent slopes (PF).—These are imperfectly drained soils of the first bottoms. They were derived from alluvium composed of a mixture of sand, silt, and clay. These soils, of sandstone and limestone origin, occur in the valley section in such an irregular manner that it is impossible to map them separately. The surface textures, ranging from fine sandy loam to silty clay loam, occur so irregularly it is impossible to designate any given texture as typical. The colors vary from brownish gray to brown or light reddish brown, depending upon the source of parent material. The soils are slightly acid to strongly acid and subject to rather frequent flooding. Certain row crops, hay, and pasture do fairly well.

Most areas of Philo-Lindside soils, undifferentiated, occur in the Allen-Hollywood-Christian-Atkins association along Cotaco and Flint Creeks and their tributaries. The natural cover consists chiefly of deciduous hardwoods. Profiles of the Philo and Lindside types are described elsewhere.

Use and management.—Philo-Lindside soils, undifferentiated, are well suited to corn, hay, and pasture. The soils are generally low in plant nutrients, but workability is good except in the wet seasons. Conservability is fairly good, but productivity is moderately low unless liberal applications of fertilizer are used. The suitability of these soils for crops is quite similar to that of Philo fine sandy loam.

Approximately 75 percent of the area of Philo-Lindside soils, undifferentiated, has been cleared and is used for crops and pasture. Little fertilizer is used, and rotations are usually short. Corn, soybeans, and annual lespedeza are the major crops. Sorghum and other crops are also grown. Crop yields are similar to those produced on Philo fine sandy loam.

Pope fine sandy loam (0 to 2 percent slopes) (Pg).—This well-drained soil on first bottoms consists chiefly of material washed from soils underlain by sandstone and shale. Its surface is nearly level or very gently undulating. All areas are subject to stream overflow, although they are not flooded so frequently as associated areas of Philo and Atkins soils. Internal drainage is moderate. Most of this soil is in the Allen-Hollywood-Christian-Atkins soil association along Flint and Cotaco Creeks. The original cover was probably deciduous hardwoods.

Profile description:

0 to 6 inches, brownish-gray nearly loose fine sandy loam; contains much fine to very fine sand; organic matter, moderate.
6 to 18 inches, weak-brown to dark-brown friable fine to very fine sandy loam; organic matter moderately high.
18 to 30 inches, moderate yellowish-brown to weak-brown fine to very fine sandy loam; organic matter, moderately low.
30 to 42 inches, moderate yellowish-brown friable fine sandy loam; organic matter, low.

Pope fine sandy loam is medium acid in the surface layers and strongly acid in the lower part; its natural fertility is fair to moderate. It is very permeable to roots and moisture, and its moisture-holding capacity is fair. Aside from flooding, moisture relations are favorable for most crops and pasture plants.

Use and management.—This soil is well suited to crops and pasture. Its productivity is moderate to high, and it responds well to fertilization. It is easily worked and conserved. Flooding is somewhat a hazard, but otherwise the soil is suited to a wide variety of crops.

Practically all of this soil has been cleared and is used for crops and pasture. Corn and hay are the dominant crops, although cotton and small grains are planted on a few of the higher lying areas. Short rotations are used, but legumes other than annual lespedeza and soybeans are seldom grown. Corn and small grains receive light applications of fertilizer, and lime is sometimes used for hay crops and pasture. Under good management practices, crop yields can be increased 10 to 25 percent.

Pottsville shaly silt loam, hilly phase (10 to 20 percent slopes) (Pk).—This soil is hilly and shaly. It has a brownish-gray to yellowish-brown surface soil, a yellow to reddish-yellow or streaked upper subsoil, and varicolored parent rock of partially weathered acid shale and thinly bedded sandstone. It occurs largely on Sand Mountain. Internal drainage is moderate. The original vegetation was largely

deciduous hardwoods mixed with pine. Most of this soil is in the Stony rough land-Pottsville-Hartsells association.

Profile description:

0 to 1 inch, brownish-gray friable loam; has numerous small fine-grained sandstone fragments and a few large pieces of sandstone on the surface; organic matter, low.
1 to 6 inches, light yellowish-brown friable shaly fine sandy clay loam.
6 to 14 inches, moderate yellowish-brown clay faintly splotched with pale yellow and reddish brown.
14 to 21 inches, light brownish-gray to yellowish-gray sticky plastic clay, mottled with gray, pale yellow, and yellowish brown.
21 to 40 inches, slightly weathered very thinly interbedded gray shale and light-brown sandstone.

The heavy, partially weathered underlying material lies a few inches to more than 2 feet below the surface. The sandstone fragments vary from an occasional stone on the surface to expanses of almost solid bedrock. The size of the rock fragments ranges from about 1 inch to 3 feet or more in diameter. The soil is very strongly acid and very low in organic matter.

Use and management.—This soil has fair tilth and good moisture absorption under natural conditions, but it is erosive when opened to cultivation. Workability therefore becomes difficult under clean tillage, and the strong slopes and heavy, tight subsoil deter conservation measures.

Practically all of this hilly soil is under original or second-growth forest. Stoniness, hilly relief, and low natural fertility make the soil unsuited to crops. It is fairly good for pasture, but maintenance is difficult. It is therefore best suited to timber.

Pottsville shaly silt loam, eroded hilly phase (10 to 20 percent slopes) (PH).—This soil is similar to Pottsville shaly silt loam, hilly phase, in degree of slope, shaliness, source of parent materials, and drainage. It differs in having lost 50 to 75 percent of its original surface layer through erosion. The present surface layer is more yellowish brown than the original because the upper subsoil has become mixed with it during cultivation. External drainage is rapid to excessive, and internal drainage is moderate because of the heavy subsoil. The native cover was probably a mixture of hardwoods and pine. Most of this soil is in the Stony rough land-Pottsville-Hartsells association on Sand Mountain.

Use and management.—This soil is very poorly suited to crops and fairly to poorly suited to pasture. Its productivity is low, and it is very difficult to conserve or work because of its strong slopes, stoniness, and shallow depth to weathered soil material. Unless need for pasture and cropland is urgent, this soil is best used for forest.

Practically all of this soil was once cleared but about 75 percent has been abandoned to unimproved pasture or forest. The remaining 25 percent is in cotton and corn, with some hay and pasture crops. Little fertilizer is used and yields are very low. Areas used for pasture should be treated with lime, phosphorus, and potassium. Permanent crops, such as kudzu and sericea lespedeza, are suitable and will furnish temporary grazing and aid in conserving the soil.

Pottsville shaly silt loam, severely eroded hilly phase (10 to 20 percent slopes) (PL).—This soil is severely eroded but otherwise similar to Pottsville shaly silt loam, hilly phase. Erosion has re-

moved more than 75 percent of the original surface layer, and in many places a part of the upper subsoil. Numerous gullies range from 6 inches to more than 2 feet in depth. Internal drainage is moderate, and external drainage is very rapid to excessive. Areas of this soil are comparatively limited and are scattered throughout the Sand Mountain plateau in the southern part of the county. The yellowish-brown surface layer consists mostly of subsurface and subsoil material.

Use and management.—The soil is not suited to tilled crops and is poorly suited to pasture because of its erodibility, stoniness, hilliness, and low fertility. If it must be tilled, it is probably best for close-growing crops such as kudzu. Although all of this soil was once used for crops and pasture, most of it is now idle or reforested with pine. Forestry is probably its best use.

Pottsville shaly silt loam, steep phase (20+ percent slopes) (PM).—This soil is recognized by its steep slopes, shaliness, and thin layer of surface material over a heavy, gray and reddish-brown, shaly subsoil. The parent material is similar to that of Pottsville shaly silt loam, hilly phase, but contains more large sandstone fragments. External drainage is very rapid, and internal drainage is moderate. Most of this soil is in the Stony rough land-Pottsville-Hartsells association in the southern part of the county. The natural cover consists of hardwoods with some pine.

Use and management.—Because of its shaliness, strong slopes, and droughtiness, this soil is not well suited to crops or pasture. Some areas, however, are used for unimproved pasture. Practically all of this steep soil is under forest, to which use it is best suited. If the areas were cleared, kudzu would be a good crop.

Robertsville silt loam (0 to 2 percent slopes) (RA).—This gray poorly drained soil is closely associated with Taft, Tupelo, and Capshaw soils of the limestone valleys. It resembles Tyler soil in color and profile characteristics but differs in being largely of limestone origin. It occupies nearly level terraces and occurs in the lower parts of the larger stream valleys and broad terraces. The alluvial parent materials are composed mainly of old deposits derived chiefly from residual limestone, but these may be influenced with shale and sandstone materials in places.

Both external and internal drainage are very slow. Internal drainage is difficult to improve because the subsoil, especially the lower part, is heavy and sticky. The original vegetation consisted of water-tolerant hardwoods. Much of this soil is in the Decatur-Talbott-Dewey-Robertsville association. Some areas are scattered throughout the valleys, but the larger ones occur east of Danville and near Hopewell Church and Lebanon Church.

Profile description:

0 to 1 inch, brownish-gray friable silt loam faintly splotched with gray and brown; organic matter, moderate.
1 to 6 inches, light brownish-gray friable silt loam splotched with brown and gray.
6 to 12 inches, light-gray to medium-gray heavy silty clay loam mottled with brownish yellow and whitish gray; sticky when wet but moderately friable under optimum moisture conditions.
12 to 45 inches, medium-gray heavy plastic sticky clay mottled with rust yellow and some brown.

In general, this soil is fairly uniform in texture and color, but areas bordering sandy soils are influenced by very fine sandy materials and vary in friability and in composition. Although the surface is nearly level, slight undulations in places provide better drainage. In the better drained places, the subsoil is more yellow than typical of this silt loam.

The soil is medium to strongly acid. The organic-matter content is very low except in virgin areas, where it is fairly high in the topmost 1 or 2 inches.

Use and management.—This soil has fair workability and is easy to conserve, but it is low in natural fertility. Poor drainage makes it unsuited to tilled crops, but when this silt loam is drained fair yields may be expected from cotton, corn, sorghum, and hay crops. With a minimum of artificial drainage and under good management, it may become well suited to grasses. White clover, bluegrass, and lespedeza will grow fairly well if phosphorus and potassium, and possibly lime, are applied.

Approximately 75 percent of this soil is in forest; the rest is in corn, hay, and pasture. Light applications of fertilizer are ordinarily used, but crop yields are low. Although open ditches or tile drains would increase the usefulness of this soil, the advantage of drainage would be offset by the high cost of labor and the compactness of a subsoil low in organic-matter content.

Rough gullied land (Decatur and Cumberland soil materials) (2 to 20 percent slopes) (RB).—This land type consists of areas of soils over limestone, eroded to such extent that they can be reclaimed only through very slow processes. A great part of the surface soil and much of the subsoil have been lost. Gullies are numerous, and many cannot be crossed with farm machinery. The soil profiles are so mutilated that the soils can be mapped only as a miscellaneous land type. Most of the areas occur on slopes of less than 12 percent.

The total acreage is small and is widely scattered throughout the valleys. Few areas are more than 5 to 8 acres in extent. They represent, in general, mutilated areas of Decatur, Cumberland, Talbott, and Colbert soils.

Use and management.—All of this land type was once used for crops and pasture but is now abandoned. Moisture relations for plants are very unfavorable, and the capacity for holding moisture available to plants is very low. Some areas would never be suitable for pasture or crops, even following a period of rejuvenation, and should be in forest. Kudzu is probably best suited: once established, it would provide some grazing and help control erosion.

Rough gullied land (Linker and Hartsells soil materials) (6 to 20 percent slopes) (RC).—This land type consists of areas of soils developed over residual sandstone and shale. It is eroded to such an extent that reclamation is impractical except over long periods of time. The areas have been reduced to such an intricate pattern of gullies that field operations are essentially prohibited. The soil profiles are so mutilated, the areas can be mapped only as a miscellaneous land type.

Use and management.—Practically all of this land type was once cleared and cultivated, but most of it now is abandoned. It is not well

suited to crops or pasture. Some areas are nearly bare or have only a scattered growth of persimmon, sassafras, broomsedge, and briers. Others have a good cover of pine. The bare areas might well be reforested or planted to kudzu. Kudzu, when properly established, would aid in protecting the land from further erosion and would furnish temporary grazing.

Sequatchie fine sandy loam (2 to 6 percent slopes) (SA).—This light-brown to weak-brown fine sandy loam soil occupies low stream terraces in the limestone valleys. Streams deposited this sandy alluvium, which was derived chiefly from sandstone and shale materials mixed with some material from limestone. The surface is nearly level to very gently sloping. Both internal and external drainage are moderate. Most areas are scattered along Cotaco and Flint Creeks and near Austinville. Practically all of this soil has lost from 25 to 50 percent of its original surface layer by erosion. The native vegetation consisted of mixed hardwoods and pines.

Profile description:

0 to 2 inches, weak-brown moderately loose fine sandy loam; relatively low in organic matter.
2 to 5 inches, weak-brown to yellowish-brown friable fine sandy loam; low in organic matter.
5 to 10 inches, moderate yellowish-brown friable fine sandy loam.
10 to 20 inches, light-brown heavy fine sandy loam; weakly developed nut structure.
20 to 30 inches, light-brown friable fine sandy clay loam splotched with gray and rust brown; slightly firm in place; weakly developed blocky structure.
30 to 42 inches, yellowish-brown fine sandy clay loam mottled with gray and some rust brown; slightly compact but friable.
42 to 54 inches, yellowish-brown fine sandy clay loam to fine sandy clay mottled with gray and rust brown; compact but friable.

The soil is medium to strongly acid and moderately low in organic matter. It is moderately fertile and very permeable to roots and moisture. Its capacity for holding moisture available to plants is good. The moisture from light rains during dry periods is largely available to plants because only small amounts are absorbed by the clay particles.

This soil varies mainly in color and texture of its subsoil, which ranges from light yellowish brown to strong brown. In some places the subsoil is rather sticky and plastic when wet and hard or very compact when dry.

Use and management.—This soil is good to excellent for crops and moderately good for pasture. Its productivity is good, it responds well to good management, it is suited to a wide variety of crops, and it is easily worked and conserved. With proper management it should be particularly well suited to root crops and truck crops.

Nearly all of this soil has been cleared and improved for crops and pasture. Most areas are used in a short rotation; some are used for cotton several years in succession. Little barnyard manure is applied, and green-manure crops are not commonly grown. Moderately light applications of mixed fertilizer are used for cotton and small grains. Lime has been applied to some areas, especially those used for pasture.

This soil needs organic matter, lime, and a complete fertilizer at regular intervals if it is to be kept highly productive. Much of the

nitrogen can be supplied in a rotation that includes hairy vetch, crimson clover, or a similar legume grown as a winter cover crop. Alfalfa, sorghum, and truck crops—especially potatoes and sweetpotatoes—do well on this soil if it is properly managed.

Sequatchie fine sandy loam, eroded phase (2 to 6 percent slopes) (SE).—This soil is similar to the normal or only slightly eroded phase of Sequatchie fine sandy loam in source of parent material, slope, association with other soils, and profile characteristics. It differs in occupying slightly higher positions and in being more eroded. It has lost 50 to 75 percent of its original surface layer. A few areas are included that occupy slopes up to 12 percent. Internal drainage is moderate. External drainage is moderate, although it may become moderately rapid on unprotected areas. Most areas are small. The surface soil is generally yellowish-brown friable fine sandy loam; the rest of the profile is similar to that of the other Sequatchie soils.

Use and management.—This soil is well suited to tilled crops but is only fair for pasture. Its workability is good but erosion has impaired its tilth. The soil responds well to good management, has fair productivity, and is suited to many commonly grown crops, but it requires more conservation practices than Sequatchie fine sandy loam. Under long rotations that include a legume and heavy fertilizer applications, it is productive of many crops, particularly sorghum and market vegetables.

All of this soil was once improved for farming, but some areas now are idle. Most of these areas are covered with pine, sassafras, persimmon, sedgegrass, and briers. Cotton, corn, and soybean hay are the major crops. Fertilization is usually light, and yields are moderately low. Yields can be increased 10 to 25 percent by using legumes and large applications of commercial fertilizer. Pasture will furnish considerable grazing if fertilized with phosphorus and potassium and if lime is applied liberally. Contour plowing, stripcropping, and terracing would conserve the soil in some areas, and close-growing crops would benefit the more eroded areas.

Stony smooth land (Talbott and Colbert soil materials) (2 to 6 percent slopes) (SE).—This land type has many limestone outcrops that make it unsuitable for tillage (pl. 3, *B*). It differs from Stony rolling land (Talbott and Colbert soil materials) in having a smoother surface, or slopes seldom exceeding 5 percent. Most of it is associated with Colbert and Talbott soils and with the other limestone land types. The native vegetation consists largely of cedar, with some oak and hickory.

Use and management.—Most of this land type is used for pasture, to which it is well suited; a small part is covered with forest. The pasture vegetation is similar to that on the stony rolling land type, but its carrying capacity is greater because it is not so droughty.

Stony rolling land (Talbott and Colbert soil materials) (6 to 12 percent slopes) (Sc).—Areas of this land type are commonly referred to as limestone rockland or cedar glade. The land has many limestone outcrops that make it unsuitable for tilled crops. The rock outcrops occupy about 50 to 60 percent of each area; the rest is Talbott and Colbert soil materials. The thickness of this soil material ranges from a very few inches to 36 inches or more. Where the thickness is

15 inches or more, the profile is comparable to that of Colbert silt loam. In many spots, however, it is redder and more like the profile of Talbott silt loam. The surface is rolling; external drainage is moderately rapid and internal drainage is slow. Practically all of this soil occurs in the limestone valleys and at the foot slopes of both Sand and Little Mountains. The natural cover consists largely of cedar, although oak, hickory, locust, and other trees are found.

Use and management.—This land type is not suited to tilled crops but is fairly good for pasture. A few areas have patches that could be cultivated by hand labor or possibly by horse-drawn implements.

About 75 percent of this land type is in forest, 20 percent in pasture, and 5 percent in crops. Much of the forested area is sparsely covered and is used for unimproved pasture. Corn is the major crop but yields are low. Pasture is good where the soil material is relatively deep to bedrock. In most areas bluegrass and white clover produce good grazing during spring and early in summer, but the carrying capacity is lowered during dry seasons. Pasture plants will respond well to phosphorus and potassium, and, in some places, to lime.

Stony rough land (Muskingum soil material) (12 to 45 percent slopes) (Sᴅ).—This land type consists of numerous sandstone outcrops and escarpments, separated by an irregular accumulation of Muskingum stony fine sandy loam, sandstone fragments, and boulders. The surface is predominantly steep. Most of this land type is in the Stony rough land-Pottsville-Hartsells soil association. It occurs along the breaks of Sand and Little Mountains. The native vegetation consists largely of pine intermixed with hardwoods.

Use and management.—Practically all areas are in forest, most of which has been cut over. Because this land type is too stony and steep for cultivated crops or pasture, it is best suited to forest.

Taft silt loam (0 to 2 percent slopes) (Tᴀ).—This light-colored imperfectly drained soil lies on low stream terraces. The alluvial parent materials were derived largely from limestone. The soil is closely associated with the Etowah, Wolftever, Robertsville, Captina, and Capshaw soils. It is similar to the Tupelo soils in position and drainage but differs in having a friable subsoil. It is slightly higher and better drained than the Robertsville soil. It differs from Etowah loam in having a grayer color and slower internal drainage. The surface is nearly level to very gently sloping, and external drainage for most of it is moderately slow to moderate. Internal drainage is slow, and erosion is not very active.

Taft silt loam is in the northeastern part of the county along the Tennessee River and Cotaco Creek. Some small areas, however, are scattered throughout the limestone valleys. The native vegetation consists of mixed hardwoods and pine.

Profile description:

0 to 4 inches, light brownish-gray friable silt loam; contains some organic matter.

4 to 9 inches, brownish-gray friable silt loam; moderately low in organic matter.

9 to 18 inches, light yellowish-brown friable silty clay loam faintly splotched with brown and weak yellow; weak nut structure; low in organic matter.

18 to 25 inches, light yellowish-brown silty clay loam mottled with gray and brown; moderately compact but friable under optimum moisture conditions; weak nut structure; very low in organic matter.

25 to 36 inches, mottled brown, gray, and weak yellow silty clay; compact to firm in place; blocky to nut structure.
36 to 48 inches, gray, moderate-yellow, and brown very compact silty clay, the gray color increasing with depth; breaks into a nut structure under pressure.

The soil is strongly acid to very strongly acid throughout the profile.

Variations in profile color and in texture or consistence of the subsoil are common. The color ranges from gray to yellow or brownish yellow, especially in the subsoil. Slight variations in drainage are strongly reflected in the color. In the better drained areas the soil contains more yellow, less gray, and fewer splotches or mottlings. The splotches and mottlings are shades of gray, yellow, brown, and rust brown, and in places are red to reddish brown.

Use and management.—Taft silt loam is moderately well suited to pasture and some tilled crops. It is moderately low in productivity but easily worked. Erosion presents serious problems only in small spots on the stronger slopes. The nearly level areas cannot be cultivated early in the spring when the water table is high.

More than 75 percent of this soil is now cleared and planted to crops and pasture. The dominant crops are corn, soybeans, lespedeza, and cowpeas. Cotton is planted on the better drained areas. Taft silt loam responds fairly well to good management and produces fair to good yields. Fertilization is generally light and crop rotations are short. The soil is not suitable for winter legumes and fall-planted small grains unless artificial drainage is installed to prevent water from standing on the areas during winter and spring.

Talbott loam, eroded undulating phase (2 to 6 percent slopes) (Te).—This soil is similar to Talbott silty clay loam, eroded undulating phase, in slope, position, and parent material but differs in color and texture of the surface layer. Much of the original surface layer has been lost by erosion, probably 50 to 75 percent. External drainage is moderate, but the slow internal drainage is caused by the heavy subsoil. The native vegetation consists largely of hardwoods, with some pines.

The parent materials are largely of residual limestone, though there is some influence from sandstone in the plow layer. The 3- to 5-inch surface layer is grayish-brown to light grayish-brown friable loam. The rest of the soil profile is similar to that of the other Talbott soils. This soil is closely associated with Colbert soils and other members of its own series.

Use and management.—This soil has fair workability and low productivity but is moderately easy to conserve. Its suitability for agriculture is similar to that of Talbott silty clay loam, eroded undulating phase.

Practically all of this soil is used for crops and pasture. Cotton, corn, hay, and small grains are commonly grown. Soybeans and annual lespedeza are the dominant hay crops, although sericea lespedeza is suited and makes fair yields. Corn and cotton, with occasional winter legumes, is the common rotation, although a longer one might be suitable. Under good management, pastures furnish considerable grazing, especially during spring and early in summer. The soil is low in organic matter. Winter legumes should be planted as often as practical. Contour tillage, stripcropping, and terracing might improve some areas.

Talbott loam, eroded rolling phase (6 to 12 percent slopes) (TD).—This soil is similar to Talbott loam, eroded undulating phase, in parent material and all profile characteristics. It differs in having stronger slopes and, in some spots, a thinner loamy surface layer. External drainage is moderately rapid on the steeper slopes, but the heavy subsoil causes slow internal drainage. The soil is closely associated with the other soils of the Talbott series and with Colbert soils.

Use and management.—The soil is fairly easy to work but rather hard to conserve. Productivity is moderately low, but its eroded condition and rolling slopes limit its suitability. Under good management the soil is suited to most crops commonly grown.

This soil is well suited to crops and pasture but low in plant nutrients. Yields are generally low. Crop suitabilities and fertilizer practices are about the same as for Talbott loam, eroded undulating phase. Crop yields, however, are 10 to 25 percent lower, especially yields of corn and annual hay.

Talbott silt loam, undulating phase (2 to 6 percent slopes) (TF).—This is a smooth to undulating soil of the upland areas in the limestone valleys. It differs from Dewey silt loam, undulating phase, chiefly in having a subsoil of heavier consistence, and from Colbert silt loam, level phase, in being more red, especially in the subsoil. The soil occupies relatively small irregularly shaped areas, which most commonly occur near the base of the rocky limestone slopes in close association with Colbert soils. Internal drainage is slow but adequate for all commonly grown crops. About half of this soil has lost from 25 to 50 percent of its surface layer through erosion. This residual soil was derived from weathered limestone. The forest cover consists of oak and hickory mixed with some redcedar. Most of this soil is in the Allen-Hollywood-Christian-Atkins association, but small areas are scattered throughout the valleys.

Profile description:

0 to 3 inches, brownish-gray to weak-brown friable silt loam; moderately high in organic matter.

3 to 7 inches, moderate-brown heavy silty loam to silty clay; moderately friable under optimum moisture.

7 to 18 inches, weak reddish-brown to moderate reddish-brown heavy sticky plastic clay; massive.

18 to 30 inches, light-brown heavy sticky plastic clay faintly mottled with yellow, gray, and rust brown; contains numerous rust-brown concretions.

30 to 44 inches, gray, yellow, and brown mottled heavy, plastic, sticky clay; weak blocky structure when dry, massive when wet.

44 to 52 inches, light yellowish-brown heavy, tough, plastic clay mottled with gray and reddish brown.

The soil is strongly acid and has numerous rust-brown concretions on the surface and throughout the profile. The organic content is generally low, especially where the fields have been cultivated.

The surface soil varies from grayish brown to reddish brown and the subsoil from yellowish brown to brownish red. The soil materials are usually free or relatively free of chert, rock fragments, and sand or other gritty materials. Nevertheless, chert fragments are common on the surface or in the soil materials in many areas and appear to increase with depth. Rock fragments or fragments of chert may occur in some areas, especially those lying adjacent to the lower limestone slopes.

Use and management.—This soil has good workability and conservability although runoff control is needed on the more sloping parts. The productivity is limited chiefly by unfavorable moisture relations. The heavy dense subsoil is slowly pervious to moisture. The amount of moisture available to plants is more limited than that of the more friable open soils. The slow percolation of water through the subsoil favors the accumulation of runoff.

About half of this soil has been cleared for crops and pasture. Cotton, corn, small grains, and hay are grown. Yields under ordinary conditions are fairly good but are lower than those obtained on Dewey silt loam, undulating phase. They are generally higher than those on Colbert silty clay loam, eroded undulating phase. Alfalfa may be grown successfully if limed and properly fertilized with phosphorus and potassium. Pasture legumes and grasses do well on fertilized and limed areas. Short rotations are generally practiced, but winter legumes are not often used.

Organic matter is soon lost from the soil once it is cultivated, largely through sheet erosion. The surface soil assumes a redder color, and tilth also becomes poorer the longer the soil is cultivated. Close-growing crops, contour tillage, stripcropping, and terracing may benefit some areas.

Talbott silty clay loam, eroded undulating phase (2 to 6 percent slopes) (Tk).—This soil, like Talbott silt loam, undulating phase, was formed in limestone valleys, probably under hardwood forest. The parent material is residuum from the weathering of relatively impure limestone. This phase has lost from 50 to 75 percent of its original surface layer. It is closely associated with Colbert, Dewey, and Decatur soils and with the stony lands (Talbott and Colbert soil materials) and other members of the Talbott series. Internal drainage is slow but adequate for farming. Surface drainage is moderate but may become rapid in areas occupying stronger slopes. The soil is fairly important to agriculture of the county because it covers a large area. A few scattered areas contain numerous chert fragments, which are indicated on the maps by appropriate symbol.

The profile of this soil is similar to that of Talbott silt loam, undulating phase, except the surface layer is thinner, more red in color, and heavier in texture. These conditions were brought about by erosion and the mixing of the upper subsoil with the surface layer through cultivation. The original cover was probably hardwoods, with some pine and cedar intermixed. Cutover and abandoned areas are dominantly reverting to pine.

Use and management.—This soil is moderately productive and fairly easy to work, but comparatively hard to conserve. To some extent, erosion has limited its range of use suitability, impaired its tilth, and lowered its moisture-absorbing and moisture-holding qualities. The soil is suited to tilled crops. Most of the field crops commonly grown in the county will do well, although this soil is less well suited to corn and annual hays than many others.

In most places management practices are not completely adjusted to soil needs. Cotton, small grains, soybean hay, and corn are major crops, although other hay crops and pasture are often grown. Crop rotations are generally short and applications of commercial fertilizer small. Winter legumes should be used consistently in the crop rota-

tion. Pasture plants are damaged by the lack of available moisture during the summer and fall, but considerable grazing can be obtained if the pastures are well fertilized, limed, and properly seeded. With the use of well-planned long rotations that include legumes, crop yields can be increased.

Talbott silty clay loam, eroded rolling phase (6 to 12 percent slopes) (TH).—This is a reddish-brown soil of the uplands in the limestone valleys. It resembles Dewey silty clay loam, eroded rolling phase, in color and surface relief, but differs from it in consistence of the subsoil. It was similar to Talbott silt loam, undulating phase, in profile development, color, and other characteristics before erosion altered the original surface layer. At one time the soil probably supported a stand of oak and hickory, with which some cedar and pine were mixed.

Surface drainage is moderate but may become excessive on unprotected areas. Internal drainage is slow because of the compact, somewhat slowly pervious subsoil. Practically all areas of this soil have lost more than three-fourths of original surface soil through erosion. Many areas, especially those occupying the steeper slopes, have numerous shallow gullies, which are indicated on the map by the symbol for moderate gully erosion. This soil is scattered throughout the limestone valleys, but a major part is in the Moulton-Cotaco Valley.

The profile is similar to Talbott silt loam, undulating phase, except that the surface layer is thinner, more red in color, and heavier in texture. The mixing of the thin surface layer with the upper subsoil during cultivation has caused this change.

Use and management.—Erosion on this soil has reduced the organic content, impaired tilth, limited suitability for use, lowered productivity, and decreased ability to absorb and hold moisture. The less eroded and well-protected areas are fairly well suited to some kinds of crops and to pasture.

Practically all of this soil was once used for crops and pasture, but much of it is now idle or reforested, chiefly to old-field pine. Much of the abandoned land is used for low-quality unimproved pasture. Cotton is the major tilled crop, but corn, small grains, and hay are also grown. Rotations are short and fertilization is light. Crop yields are generally low. Pasture furnishes only limited grazing on this eroded soil, and the grasses are generally of low quality. The steeper and more eroded areas probably could be planted to close-growing permanent crops such as kudzu and sericea lespedeza, which would also furnish temporary grazing for part of the year.

Talbott silty clay loam, severely eroded rolling phase (6 to 12 percent slopes) (TL).—This soil is closely associated with the eroded rolling phase of Talbott silty clay loam. It differs from that soil mainly in being more severely eroded. Its profile is somewhat similar to that of Talbott silty clay loam, eroded undulating phase, but more than 75 percent of the original surface has been lost, and, in places, a part of the upper subsoil.

The surface 2 to 5 inches of heavy silty clay loam varies in color, depending on the supply of organic matter and the amount of subsoil material present. Occasionally, this layer is entirely missing and the upper part of the original subsoil is exposed. The surface layer con-

tains very little organic matter, and the profile is strongly to very strongly acid. There are numerous gullies a few inches to more than 3 feet deep.

Use and management.—This soil is difficult to till and conserve and is not highly productive, consequently, it is generally not suitable for tilled crops. It may be used satisfactorily for temporary pasture if sown to some permanent close-growing plant such as kudzu.

All of this soil was formerly cleared, but only a small part in the less severely eroded and more gently sloping areas is used for crops. Crop yields are low. Large areas are now covered with irregular stands of old-field pine. Close-growing crops, such as kudzu and sericea lespedeza, might serve to check erosion and furnish a limited amount of hay and pasture.

Talbott silty clay loam, eroded hilly phase (12 to 20 percent slopes) (Tc).—This soil has a profile similar to that of Talbott silty clay loam, eroded rolling phase. It differs mainly in occurring on stronger slopes on the low hills in and bordering the low-lying limestone valleys. It is in the limestone valleys and the Moulton-Cotaco Valley. The soil has formed from impure limestone materials, probably under hardwood forest. Surface drainage is rapid but internal drainage is slow because the subsoil is heavy and slowly pervious.

The profile is similar to that of other eroded Talbott soils, but the surface layer is generally thinner and the subsoil in manp places is not so red. Mottlings of yellow and gray are usually closer to the surface in this soil.

Use and management.—Poor workability and conservability and hilliness make this soil very poor for farming. It was cleared for crops and pasture at one time, but much of it is now idle or abandoned to forest or unimproved pasture. A few small areas are used for crops, but yields are very low. The soil is probably best for forest or temporary pasture. Kudzu would do well on this soil and, once established, would furnish considerable grazing. Other pasture plants will thrive on the soil if it is properly managed.

Talbott cherty silty clay loam, eroded rolling phase (6 to 12 percent slopes) (Tc).—This soil is similar to Talbott silty clay loam, eroded rolling phase, in parent materials, slope, and profile characteristics. It differs chiefly in having a few outcrops of limestone bedrock and many chert fragments on the surface and throughout the profile. Erosion has worn away 50 to 75 percent of its original surface layer and a part of the upper subsoil in a few areas. External drainage is moderate but may become rapid on the steeper slopes. Internal drainage is slow because of the heavy tight subsoil. The chert fragments in the profile tend to improve permeability. Most of this soil occurs at the base of rocky limestone slopes.

Use and management.—Chert on the surface and throughout the profile make this soil unsuited to tilled crops. It is well suited to pasture.

Nearly all of this soil has been cleared and used for crops and pasture. Some hay crops do fairly well, but its best use is probably for pasture. On those areas used for crops, the yields are often low.

Talbott cherty silty clay loam, eroded hilly phase (12 to 20 percent slopes) (TB).—This soil is closely associated with the limestone rocklands but differs in having less limestone bedrock outcrop and more chert fragments on the surface and in the soil profile. It occupies stronger slopes than Talbott cherty silty clay loam, eroded rolling phase. External drainage is rapid to excessive on the stronger slopes. Internal drainage is moderately slow but it is somewhat better than for Talbott silty clay loam, eroded hilly phase, because the chert fragments in the subsoil improve permeability. The original cover probably consisted of deciduous hardwoods, with some cedar and pine intermixed.

Use and management.—The chert in the plow layer makes this soil hard to work and unsuited to cultivation, although moisture relations are fair to good.

Most of this soil is now in unimproved pasture, although pine and scrub oaks have come in where the cleared land has reverted to forest. The soil is best suited to forest and pasture. Considerable grazing may be had under good management.

Tilsit silt loam, level phase (0 to 2 percent slopes) (TP).—This soil is similar to Tilsit silt loam, undulating phase, in source of parent materials and profile characteristics but it occupies nearly level to very gentle slopes, and the mottled, tight, compact substratum occurs at depths of 12 to 20 inches. The slow external and internal drainage are brought about by the level relief and the tight, compact lower subsoil.

This soil is better drained than Johnsburg loam but in most places it is not so well drained as Tilsit silt loam, undulating phase. It is very strongly acid and low in organic matter throughout the profile. About two-thirds of this level phase has lost up to 50 percent of its original surface layer through erosion. Originally the soil probably supported a pine-and-hardwood cover. Most of it is in the Tilsit-Linker-Cotaco association.

Use and management.—This soil is well suited to tilled crops and pasture. Its friability and smooth surface make it easy to cultivate but in more nearly level areas it remains wet longer in the spring than Tilsit silt loam, undulating phase. It is easy to conserve, and very few areas require terracing to control runoff. Although its productivity is moderately low, it is responsive to good management.

About 60 percent of this soil has been cleared for crops or pasture. Use and management are about the same as for Tilsit silt loam, undulating phase, although crop yields are commonly 10 to 20 percent lower. Pasture grasses thrive longer on this soil than on Tilsit silt loam, undulating phase, because moisture relations are more favorable.

Tilsit silt loam, undulating phase (2 to 5 percent slopes) (TS).—This brownish-gray soil has developed from the interbedded fine-grained sandstone and acid shale on the Little Mountain plateau. It has a compact layer in the lower subsoil. Part of the soil has lost 25 to 50 percent of the original surface layer through erosion, but the rest is essentially uneroded. Surface drainage is moderate. The slow internal drainage, brought about by the compact lower subsoil, is adequate for agricultural uses. Originally this soil supported a hardwood-and-pine forest.

Tilsit silt loam is one of the extensive and important agricultural soils of the county. Most of it is in the Tilsit-Linker-Cotaco soil association near Somerville, Hartselle, and Neel.

Profile description:

0 to 2 inches, light brownish-gray friable silt loam; moderately high organic-matter content.
2 to 14 inches, light yellowish-brown friable silt loam; contains a high percentage of very fine sand; soft crumb structure.
14 to 24 inches, moderate yellowish-brown silt loam faintly splotched with gray in the lower part; slightly compact but friable; soft crumb structure.
24 to 30 inches, moderate yellowish-brown silty clay loam, mottled with gray and rust brown; firm to moderately compact, but friable; nut structure.
30 to 36 inches, light yellowish-brown, hard silty clay loam mottled with rust-brown and gray; very compact.
36 to 54 inches, strong yellowish-brown silty clay loam mottled with gray and brown; very compact, hard when dry; breaks into a fairly friable mass under optimum moisture conditions.

The profile is strongly to very strongly acid throughout. The organic-matter content is low to very low, especially in cultivated areas.

The surface texture varies from a fine sandy loam to a silt loam along the northern rim of the Little Mountain plateau, especially near Somerville. The compact layer is 15 to nearly 30 inches below the surface. The greater depths to the compact layer are often in forested areas, whereas the more shallow depths are in cultivated fields where erosion has been greatest.

Use and management.—The smooth surface and friability of this soil make it easy to till, and it is well suited to crops and pasture. Under proper management erosion is not severe, although the more sloping parts require special care. The soil has good moisture-absorbing and moisture-holding qualities. Its natural productivity, however, is moderately low, or somewhat similar to that of Hartsells fine sandy loam, undulating phase. It is not so easily kept at a high level of fertility as the smooth soils of the Dewey and Decatur series.

About 75 percent of this soil is used for crops and pasture. Cotton, corn, small grains, and hay are the dominant crops. Legumes grow well and are often used in the rotation. Cotton followed by winter legume and then by corn is the usual rotation. However, some farmers use longer rotations that consist of cotton followed by a winter legume and then corn, and finally a small grain followed by hay. Crop yields vary considerably according to management. Sorghum, root crops, and truck crops produce well if properly managed.

The soil tends to erode easily and, therefore, most areas should be tilled on the contour. Winter legumes and other green-manure crops would add organic matter and aid in erosion control.

Tilsit silt loam, eroded undulating phase (2 to 5 percent slopes) (To).—Because this is the most extensive of the Tilsit soils, it is important to the agriculture of the county. It is similar to Tilsit silt loam, undulating phase, in position, slope, and profile. It differs in having lost from one-half to three-fourths of the original surface layer through erosion. The present surface layer is therefore more gray and somewhat thinner than the original. The soil is moderately well drained both internally and externally. On the more sloping

parts, however, surface drainage may become moderately rapid and require some special care.

Most of this soil is in the Tilsit-Linker-Cotaco association near Somerville, Hartselle, and Neel.

Use and management.—This soil has good workability and moisture relations, even though it is badly eroded. Its productivity and organic-matter content are low, but it is very responsive to good management. It is well suited to all crops commonly grown, including truck crops.

All of this soil has been improved for farming. Rotations are usually short, but rates of fertilization are moderately high. A rather large acreage of winter legumes is planted annually. Suitable relatively long rotations consist of cotton followed by a winter legume, then corn, followed by a small grain and hay. With improved practices higher crop yields can be attained. On the more eroded and stronger slopes more close-growing crops should be planted. All areas probably should be tilled on the contour.

Tilsit silt loam, rolling phase (5 to 10 percent slopes) (TR).—Except for its stronger slopes, this soil is almost identical with Tilsit silt loam, undulating phase. Surface drainage is moderate but may become slightly rapid on unprotected areas. Internal drainage is slow but rapid enough for farming. From 25 to 50 percent of the original surface layer has been eroded from a fourth of this soil. The remaining areas are essentially uneroded.

The soil is closely associated with Linker and Muskingum soils and with other members of its own series. It is the least extensive of the Tilsit soils, except for the severely eroded rolling phase. Most of it is in the Tilsit-Linker-Cotaco association of soils near Somerville, Hartselle and Neel. The soil is strongly to very strongly acid and moderately low in organic matter. Hardwoods with a mixture of pine made up the original cover.

Use and management.—This soil is well suited to a wide variety of crops. It is easily worked and moderately easy to conserve but is low in plant nutrients. The soil, however, is very responsive to good management.

Approximately one-fourth of this soil has been cleared for crops and pasture. With good soil-conserving practices all of it might be used for agriculture. Crop suitability and management practices are similar to those of other members of the Tilsit series. In general, crop yields would probably be about the same as those on the eroded undulating phase, but close-growing crops, contour tillage, and strip-cropping and, in some instances, terracing would be needed when cultivation is started.

Tilsit silt loam, eroded rolling phase (5 to 10 percent slopes) (TN).—Erosion has worn away 50 to 75 percent of the original surface layer from this gray soil, which probably developed under hardwood-and-pine forest. It is very strongly acid and low in organic matter. Most of it is in the Tilsit-Linker-Cotaco soil association. The surface layer is more grayish yellow and somewhat thinner than that of Tilsit silt loam, rolling phase. Otherwise the profile characteristics are similar.

Use and management.—Strong slopes and erodibility limit the use of this soil. It is low in plant nutrients and productivity but responds to good management. The soil has good workability and fair to good moisture-absorbing and fair moisture-holding qualities. It is somewhat droughty, especially during summer and fall.

All of this soil was once cleared for crops and pasture. Some areas now are idle or reforested, chiefly to old-field pine. Cotton, corn, small grains, and hay are grown. Suggested practices are about the same as for the eroded undulating phase, but crop yields are from 10 to 25 percent lower. Pasture is usually of low quality and grazing periods are short.

Tilsit clay loam, severely eroded rolling phase (5 to 10 percent slopes) (TM).—More than 75 percent of the original surface layer of this soil has been eroded, and a part of the upper subsoil has been lost in many places. Gullies a few inches to more than 2 feet deep are common. External drainage is rapid to excessive in many places, and internal drainage is slow because the lower subsoil is compact. Individual areas are small and widely scattered throughout the Little Mountain plateau. This soil is the least extensive of the Tilsit series.

Use and management.—This severely eroded rolling phase is not suitable for cultivation or pasture. Its organic-matter content is low, its tilth is poor, and it is difficult to conserve. Its best uses are probably for forest or for permanent crops such as kudzu or sericea lespedeza.

Practically all of this soil is idle or has reverted to old-field pine. Some areas, however, are used for unimproved pasture and crops. Pasture is of low quality, and crop yields are not large. Kudzu and sericea lespedeza will do well when well established. They would aid in erosion control and furnish some hay or temporary grazing.

Tupelo silt loam (0 to 2 percent slopes) (TU).—This soil occupies nearly level moderately low terraces in the limestone valleys. The parent material consists of alluvial deposits derived mainly from limestone residuum, but it is frequently modified by materials from sandstone and shale. External drainage is moderately slow to slow because of the nearly level relief, but usually it is adequate to prevent water from ponding during the growing season. Internal drainage is slow to very slow because the subsoil is heavy, sticky, and slowly permeable.

The native vegetation consists of water oak, white oak, hickory, willow, maple, elm, ironwood, beech, poplar, sweetgum, blackgum, dogwood, and some pine and cedar.

Tupelo silt loam is widely distributed throughout the valleys. It is closely associated with Taft, Captina, Capshaw, Etowah, and Robertsville soils. A large part is in the Allen-Hollywood-Christian-Atkins and the Holston-Monongahela-Tyler-Tupelo soil associations.

Profile description:

0 to 2 inches, light brownish-gray friable silt loam; contains some organic matter.
2 to 7 inches, weak-yellow friable heavy silt loam; contains many rust-brown concretions; soft crumb structure.
7 to 14 inches, light yellowish-brown silty clay weakly mottled with rust brown and gray; moderately friable under optimum moisture; nut structure.

14 to 22 inches, moderate yellowish-brown plastic sticky clay mottled with gray, yellow, and rust brown; massive.
22 to 33 inches, light yellowish-brown heavy plastic clay; mottled with gray, yellow, and some rust brown; massive.
33 to 45 inches, light brownish-gray heavy sticky plastic clay, mottled with gray, yellow, and dark rust brown.

The soil is strongly acid and low in organic-matter content. The number of rust-brown concretions varies from place to place. The texture and consistence of the subsoil differ throughout this silt loam, as well as the depth of the more friable upper layer and the quantity of iron-like concretions on the surface and throughout the profile.

Use and management.—Tupelo silt loam is about equal to Taft silt loam in productivity but is much less productive than Etowah loam, level phase, and Captina and Capshaw silt loams, undifferentiated. Impaired drainage limits its suitability for some crops as well as the periods during which it can be cultivated. Its workability is fair, and conservation is not a problem.

About half of this soil is used for corn and other feed and forage crops, hay, and pasture. It is not very well suited to cotton because poor drainage keeps the soil too wet and too cold in the spring for early planting. It is well suited to most pasture grasses and, when properly fertilized and limed, it should grow good-quality pasture.

The digging of open ditches would aid the naturally slow drainage. Cotton is grown on those areas that are naturally drained or where artificial drainage is used. Such areas could be used for small grains and, occasionally, for winter legumes. Summer legumes, lime, and other soil amendments would improve this soil.

Tupelo loam (0 to 2 percent slopes) (Tt).—This soil differs from Tupelo silt loam in having a lighter textured surface layer. Its 3- to 6-inch plow layer has more sand than Tupelo silt loam. The subsoil is essentially the same as that of Tupelo silt loam. The surface layer of this soil is similar to that of Monongahela fine sandy loam, but the subsoil is heavier in texture and strongly plastic in consistence.

This soil is not so extensive as Tupelo silt loam but is closely associated with it and with Monongahela fine sandy loam.

Use and management.—This droughty soil is low in natural fertility and has fair workability. Its agricultural uses are similar to those for Tupelo silt loam, but its use is similarly restricted by imperfect drainage.

About 50 percent of this soil has been improved for crops and pasture. Crop yields are about the same as those on the Tupelo silt loam, and the two soils can be used and managed in the same manner.

Tyler silt loam (0 to 2 percent slopes) (Tw).—This is a very poorly drained, light-colored, strongly acid soil. It has a mellow friable surface layer and a tough compact subsoil. It lies in nearly level to slightly depressed positions on old high terraces in the limestone valleys and is associated with Holston, Monongahela, Philo anr Atkins soils. The soil was formed from alluvium, which washed chiefly from uplands underlain by sandstone and shale but has some admixture of limestone materials in places. It is similar to Robertsville silt loam in position and drainage. The native vegetation consists chiefly of hardwood forest. Surface and internal drainage are very slow.

Tyler silt loam is rather extensive; most of it is in the Holston-Monongahela-Tyler-Tupelo soil association near Austinville.

Profile description:

0 to 1 inch, medium-gray mellow silt loam; contains a high percentage of very fine sand; moderately high in organic matter.
1 to 10 inches, whitish-gray friable silt loam, faintly splotched with rust brown; slightly firm in place but friable; very low in organic matter.
10 to 22 inches, light-gray, mottled with rust brown and yellow, heavy silty clay loam or silty clay; massive structure; moderately friable under optimum moisture conditions.
22 to 45 inches, light-gray to whitish-gray silty clay mottled with yellow and rust brown; moderately plastic when wet, compact or hard when dry.

The soil is very low in organic matter, and the entire profile is very strongly acid.

The quantity of fine sand and very fine sand varies in both the surface soil and subsoil. The lower layers of this soil are very slowly permeable to moisture, so the profile remains saturated through much of the year. It becomes very hard and dry during prolonged droughts. Aeration is generally poor but varies according to moisture conditions. Roots easily penetrate the surface layer, although their development may be impeded by unfavorable moisture. The impermeable subsoil and substratum would inhibit root development of most crop plants.

Use and management.—This soil is difficult to till, easy to conserve, and low in plant nutrients. Because of poor drainage, strong acidity, inherent poverty in essential plant nutrients, and only fair workability, this soil is not suited to tilled crops. Under good management, it is fairly well suited to pasture. Fair yields of corn, sorghum, and certain hay crops may be expected on the better drained areas.

Most of Tyler silt loam is in timber, but fairly large areas have been cleared for pasture. A few small areas are used for soybeans, lespedeza, sorghum, and corn. Probably the best use for this soil under present conditions is for pasture or forest. If lime, phosphorus, and potassium are applied liberally, pasture will furnish considerable grazing during much of the year.

Tyler fine sandy loam (0 to 2 percent slopes) (Tv).—This gray, poorly drained, very strongly acid soil is similar to Tyler silt loam in position, surface relief, forest cover, and association with other soils. It differs in having a slightly coarser texture, especially in the plow layer. In most places, the subsoils are practically the same in color and consistence. Most of this soil is in the Holston-Monongahela-Tyler-Tupelo association. Some areas are widely scattered throughout the valleys, especially where sandstone materials occur.

Use and management.—This soil is low in natural productivity and has only fair workability, but it is easy to conserve. It is not well suited to tilled crops because of its poor drainage and tilth, very strong acidity, and poverty in plant nutrients. Under good management, it is fairly well adapted to pasture plants. On some of the better drained areas, and under efficient farming practices, fair success with corn, sorghum, and certain hay crops can be expected.

A large part of this soil is in forest, but some areas are used for pasture or for growing corn, sorghum, and certain hay crops. Crop yields are generally low. Probably the most economical use for this

soil is for pasture or forest. Most areas require some artificial drainage for pasture grasses. With proper seeding and liberal use of lime, phosphorus and potassium, satisfactory pasture can be expected during much of the year.

Waynesboro fine sandy loam, undulating phase (2 to 6 percent slopes) (WD).—Erosion has worn away less of this soil than it has of Waynesboro fine sandy loam, eroded undulating phase. Otherwise the two soils are similar in source of parent materials, slopes, drainage, native cover, and all other characteristics. This soil usually occupies the ridgetops and nearly level tablelands where water runoff is not rapid. In some places from 25 to 50 percent of the original surface layer has been eroded. Most of this soil is in the Decatur-Waynesboro-Cumberland-Etowah association. A few areas of the level phase are included with this soil.

Use and management.—This soil is easy to work and conserve but relatively low in natural fertility. It is well suited to pastures and to tilled crops. Cotton, corn, small grains, truck crops, and hay produce adequately if properly managed. Alfalfa and other legumes yield well if soil amendments are properly applied.

All of this soil has been cleared and improved for crops and pasture. Management practices are about the same as those for the eroded undulating phase, but crop yields average from 5 to 15 percent higher on this soil. When properly seeded and liberally fertilized and limed, alfalfa and pasture may be expected to produce good yields.

Waynesboro fine sandy loam, eroded undulating phase (2 to 6 percent slopes) (WB). This grayish-brown, sandy, well-drained soil lies on old stream terraces in the limestone valleys. It is similar to the Cumberland silt loams in color and position; it differs from them mainly in source of parent material. The parent material is old alluvium derived largely from soils developed from sandstone residuum or influenced by it. It is modified more or less by additional materials derived from limestone and shale. It is closely associated with other members of the Waynesboro series and with Sequatchie, Holston, and Allen soils. From 50 to 75 percent of the original surface layer has been lost through erosion. A few severely eroded areas are included.

The external drainage is moderate but may become somewhat rapid on the more sloping cultivated areas. Serious soil losses may result unless measures are taken to control runoff. The internal drainage is generally moderate.

The original cover consisted mainly of oak, hickory, gums, poplar, and scattered dogwood, ironwood, persimmon, and beech, mixed with pine and ash. Old-field pine reseeds readily on this soil if given an opportunity. Most of this soil is in the Decatur-Waynesboro-Cumberland-Etowah association near Priceville, Decatur, Falkville, and Massey. It is by far the most extensive of the Waynesboro soils and is important to the agriculture of the county.

Profile description:

0 to 7 inches, moderate grayish-brown to light yellowish-brown moderately loose fine sandy loam.

7 to 27 inches, moderate-brown, grading to pale reddish-brown, mellow friable fine sandy clay loam; weak blocky structure.

27 to 60 inches, weak reddish-brown clay loam, grading to moderate reddish brown; compact to firm in place but friable; some chert fragments in lower part.

The soil is strongly acid and is low in organic-matter content, especially in cultivated areas. In some places small chert fragments and rounded quartz gravel are on the surface and throughout the profile.

The surface soil and subsoil are readily permeable to roots and air. Moisture circulates freely, but the soil retains enough water for plant growth at all times except those of very low rainfall.

The soil, as mapped, includes a few variations. A few small areas are less eroded and others are more eroded than is typical of this soil. Several small areas have darker or browner colored surface and subsoil layers than those described.

Use and management.—This soil is easy to work and fairly easy to conserve, but it is low in plant nutrients. It is well suited to crops and pasture. Because of its light texture and good internal drainage, it is particularly adapted to early vegetables.

All of this soil has been cleared for crops and pasture. Cotton, corn, small grains, and hay are the major crops.

Management requirements are moderately exacting. More lime, phosphorus, and potassium should be supplied, and amounts of nitrogen and organic matter should be maintained and increased. Measures for conserving soil and moisture are required for most areas.

Waynesboro fine sandy loam, eroded rolling phase (6 to 12 percent slopes) (WA).—This soil is similar to the eroded undulating phase in general soil profile characteristics but occupies stronger slopes. It is a grayish-brown to reddish-brown friable fine sandy loam, slightly heavier in texture and redder than the less eroded Waynesboro soils. The parent materials are largely alluvial in origin and were derived dominantly from sandstone with some influence from limestone. A few areas of a slightly eroded and gravelly phase are mapped with this soil.

External drainage is moderate under the native cover but somewhat rapid in cultivated areas. Because of excessive or rapid runoff on unprotected areas, considerably less moisture penetrates to the subsoil than under native vegetation. Careful management of this soil is essential to conserve moisture and to lessen soil losses. Internal drainage is usually moderate. Nearly all of this soil is in relatively small areas within the Decatur-Waynesboro-Cumberland-Etowah association.

Use and management.—This soil is fairly easy to till and moderately easy to conserve. The supply of organic matter, lime, and plant nutrients is rather low. Cotton, corn, small grains, and hay will do well if properly managed.

All of this soil was once cleared for cotton, corn, hay crops, small grains, and pasture. Some areas, however, are now idle or have reverted to forest consisting largely of old-field pine (pl. 4, *A*). Management practices are only fairly well adjusted to the soil. Yields are fairly low.

Waynesboro fine sandy loam, eroded rolling phase, has several special management requirements. A 3- to 4-year rotation, including row crops, legumes, hay, and small grains, will improve the productivity. Phosphorus, nitrogen, and potassium fertilizers will improve yields of all crops, and lime is necessary for success with legumes. Contour tillage should be used wherever possible, and in some places stripcropping and terracing may help to conserve soil and moisture.

Waynesboro fine sandy loam, severely eroded rolling phase (6 to 12 percent slopes) (Wc).—This soil is associated with the other Waynesboro soils on the well-drained sandy terraces. It is one of the redder and most severely eroded sandy soils in the limestone valleys. The soil differs from Waynesboro fine sandy loam, eroded rolling phase, in being less gray and heavier textured in the surface layer. The loss of the original surface materials has increased the red color in the surface layer. Some slopes between 12 and 20 percent gradient are included, but the dominant slopes of this soil are 6 to 12 percent. The soil occurs in relatively small, irregularly shaped areas closely associated with other Waynesboro soils and with soils of the Sequatchie, Cumberland, and Holston series. Internal drainage is moderate, but surface drainage is generally rapid to excessive, especially in unprotected areas.

Use and management.—This severely eroded soil is difficult to work and conserve and rather low in plant nutrients. Because of strong slope, eroded condition, and susceptibility to further erosion, it is not suited to row crops. Under good management, however, it is fairly well suited to pasture.

All of this soil has been cleared and used for crops and pasture, but much of it is now either idle or has reverted to forest. Some areas, however, are used, especially for cotton and unimproved pasture. Crop yields are low, and pasture is generally of low quality. The soil is best suited to permanent close-growing crops such as kudzu and sericea lespedeza. When well established, these crops, especially kudzu, will furnish considerable grazing and also aid in protecting the soil from erosion.

Wolftever silt loam (2 to 6 percent slopes) (We.) This is a grayish-brown to yellowish-brown soil on medium low stream terraces. It is characterized by a compact yellowish-brown subsoil. The alluvial parent materials were washed largely from limestone residuum. The presence of some very fine sand and mica flakes indicates slight influence from other parent materials. The soil is closely associated with Etowah, Captina, Capshaw, Huntington, Egam, and Melvin soils. It differs from the Etowah soils mainly in having a more compact subsoil.

Nearly all areas are on slopes of less than 6 percent, although a few included slopes range from 6 to 12 percent. External drainage is moderate; internal drainage is moderately slow. Drainage generally is fairly satisfactory for most crops commonly grown. The low lying areas, however, are subject to flooding by exceptionally high floodwaters, and the compact subsoil interferes to some extent with the movement of soil moisture. Erosion presents no serious problems, although the steeper parts require some erosion control. Although most of the soil has been only slightly eroded, a few areas have lost practically all the surface layer. The native vegetation consisted largely of hardwood forest, briers, and underbrush.

Profile description:

0 to 5 inches, light grayish-brown smooth and friable silt loam.
5 to 8 inches, moderate yellowish-brown silty clay loam; moderately compact but friable.
8 to 19 inches, yellowish-brown compact silty clay; weak blocky structure.
19 to 34 inches, light yellowish-brown silty clay; moderately compact but friable under optimum moisture conditions; less compact and more friable than the overlying layer.

34 to 54 inches, light yellowish-brown silty clay loam with some mottlings of brown and gray; the gray mottlings increase with depth; moderately compact but friable; contains numerous small mica flakes.

The surface and subsurface layers are medium acid; the rest of the profile is strongly to very strongly acid. The organic content is moderately low, especially in cultivated fields.

The variations most commonly observed are the differences in the consistence of the soil materials. In some areas the texture becomes a light silt loam that contains a high percentage of very fine sand and numerous mica flakes at depths of 24 to 30 inches. The depth to the compact layer is generally 15 to 24 inches, but in some areas may be less. In some areas the surface layer and upper subsoil layer contain a fairly large number of very fine soft concretions that give the soil a gritty feel and show as brown streaks on a cut surface.

Use and management.—Wolftever silt loam is suited to tilled crops. Its smooth surface and friable plow layer favor workability and conservability, but runoff may be somewhat of a problem. The compact subsoil interferes with root penetration, the movement of moisture, and aeration. The range of suitability for various crops and the productivity of the soil are therefore limited. Late crops are damaged by lack of moisture during the summer months.

Practically all of this soil is used for crop production. Cotton, corn, soybeans, and lespedeza are generally grown. Cotton and spring hay produce fairly good yields consistently; but seasonal moisture conditions affect yields of corn and summer hay. Fertilizer applications are lighter than on Dewey, Etowah, Hartsells, and Cumberland soils. With liberal applications of lime, phosphorus, and potassium, good pasture can be grown.

USE AND MANAGEMENT OF MORGAN COUNTY SOILS

In this section the soils of the county are placed in 21 management groups, and suitable uses and management practices are suggested for each group. All the soils in any one group require about the same kind of management. The practices suggested for a given group cannot be used as a plan of management for any particular farm. In the first place, the groups consist of soils similar in management requirements, not of soils that occur together on the landscape. Obviously, few farms have only one kind of soil, or even a number of soils that belong to one management group. Secondly, the management groups were made purely on the basis of the strong points and deficiencies of the soils. Not considered were prices for farm products, transportation, need for cash income, preferences of the operator, labor supply, or other factors to be weighed in planning the management of a farm.

GROUP 1

In management group 1 are well-drained and imperfectly drained soils of the stream bottoms and depressions, chiefly from materials of limestone origin. This group is made up of the following soils:

Abernathy silt loam.
Abernathy fine sandy loam.
Egam silty clay loam.
Huntington fine sandy loam, sanded phase.
Huntington silt loam.
Lindside silty clay loam.
Ooltewah fine sandy loam.
Ooltewah silt loam.

The soils of group 1 are fertile and easily worked and are generally not subject to erosion. All are well suited to intensive use for crops that require tillage.

These soils are level to very gently sloping and occur in upland depressions, along foot slopes of the upland, or on first bottoms. They periodically receive deposits of alluvial material. They are relatively well supplied with plant nutrients and organic matter because these materials are in the deposits left on the surface during floods.

Soils of group 1 favor easy maintenance of good tilth and allow normal retention and movement of water in the upper parts of the profile. External drainage is slow on all the soils, except on the more sloping areas of Abernathy soils. Surface drainage is generally moderate. Internal drainage is moderate in the Abernathy and Huntington soils and is moderately slow in the Egam, Lindside, and Ooltewah soils. The more sloping areas of the Abernathy soils are generally first to dry in the spring; Huntington soils, second; and Lindside and Ooltewah, last.

The soils of this group are exceptionally well suited to the production of corn, certain hay crops, and pasture. Because of temporary wetness caused by heavy rains or floods in spring, these soils, with the exception of the more sloping areas of the Abernathy, are not well suited to many winter annual or perennial crops. Small grains tend to lodge and become diseased. Cotton makes a rank growth but often matures so late that it is damaged by frost, except on the Abernathy soils where surface drainage is better. Alfalfa does well on the higher lying Abernathy soils, but it is injured by the temporary wetness in winter and spring. Alfalfa may produce well for a few years on the higher lying Huntington soil.

Management requirements.—Some of these soils are cropped intensively without applying fertilizer. Unless some fertilizer is added, their productivity may decline slowly if they are continuously used for intertilled crops. Light applications of potassium and phosphorus increase yields of corn and hay. The Egam soil and the more sloping areas of the Abernathy soils probably require more potassium and lime than the other soils of this group. Generally, however, lime is not necessary for most crops on soils of group 1.

A suggested rotation for the higher lying areas is corn followed by a winter legume such as hairy vetch or crimson clover. The legume is turned under as green manure for the corn planted the following spring. The green-manure crops and the crop that follows generally are improved by applications of commercial fertilizer, but lime is seldom necessary.

No special practices of tillage or cropping are necessary to control runoff. Because of danger from scouring during floods, spring plowing is preferred to fall plowing for the Huntington, Egam, and Lindside soils. Cover crops to be used for green manure provide some protection. Artificial drainage would improve the Lindside and Ooltewah soils, if outlets for the drains can be provided.

Permanent pastures are good without special management practices. However, applications of phosphorus, potassium, and, in some cases, lime may be beneficial. Pastures should be grazed closely or clipped periodically to encourage the growth of legumes.

GROUP 2

The soils of management group 2 are the well-drained and imperfectly drained soils of the stream bottoms and colluvial lands that were derived chiefly from materials of sandstone origin. The soils making up this group are:

Barbourville fine sandy loam.	Philo fine sandy loam.
Bruno loamy fine sand.	Philo-Lindside soils, undifferentiated.
Cotaco loam.	Pope fine sandy loam.

These soils are coarser than the soils of group 1 and have developed from alluvial materials washed from soils of sandstone and shale origin. They are moderately low in plant nutrients and organic matter. Erosion is not serious. The soils commonly occupy nearly level to very gentle slopes. Alluvium is deposited periodically by floodwaters.

These soils are well suited to intensive use for tilled crops. Their physical condition favors maintenance of good tilth and normal retention and movement of water in the upper soil layer. Bruno loamy fine sand, however, has very low capacity to hold moisture. External drainage for the group is generally slow. Internal drainage is moderate in the Barbourville and Pope, excessive in the Bruno, and slow in the rest of the soils of this group. The Bruno soil is first to dry out in the spring, and the Cotaco and Philo are last.

Management requirements.—As a group, these soils are well suited to corn, certain hay crops, and pasture. Bruno loamy fine sand, however, is poorly suited to most of the general farm crops.

Floods in winter and early in spring limit the use of soils of this group for winter crops. Winter grains tend to lodge and are more susceptible to disease than those grown on higher lying, well-drained soils. Cotton is fairly well suited, but it often makes a rank growth and is late in opening. Alfalfa is not well suited to these soils.

A complete fertilizer is necessary to keep production at a high level. These soils are cropped intensively. Nitrogen probably can be maintained at a fairly high level by using a legume in the rotation. All of these soils, except probably the Bruno, require lime for best crop production. Lime is especially needed for legumes and certain hay crops.

It is fairly safe to use these soils for intertilled crops each year. Crop rotations and fertilizers used on these soils are similar to those used on soils of group 1. Nevertheless, these soils of group 2 probably require larger applications of nitrogen and lime.

Special tillage or cropping practices are not necessary for the control of runoff. Pope and Philo soils may be damaged by scouring during floods; therefore, spring plowing is generally advisable. Cover crops to be used for green manure provide some protection against erosion. Artificial drainage would improve the Cotaco, Philo, and Philo-Lindside soils, undifferentiated, but it is often difficult to provide outlets for the drains.

Permanent pastures require lime, phorphorus, and potassium for best results. Pastures should be mowed or clipped to maintain the right proportion of legumes and to eradicate weeds.

GROUP 3

In management group 3 are the imperfectly drained, strongly acid soils of the stream terraces that were derived from mixed materials. This group is composed of the following soils:

Captina and Capshaw loams, undifferentiated.
Captina and Capshaw silt loams, undifferentiated.
Monongahela fine sandy loam.
Taft silt loam.
Tupelo loam.
Tupelo silt loam.
Wolftever silt loam.

These soils have fair moisture-absorbing qualities and fair tilth. They have moderately low supplies of plant nutrients and organic matter. They are fair to poor for tilled crops and fair to good for pasture. All the soils have moderately slow internal drainage. No soil is subject to serious erosion if it receives good management.

These soils are fairly well suited to most crops commonly grown in the county, but they are better suited to pasture.

Management requirements.—A rotation of corn, small grains, summer hay, and winter legumes is well suited to these soils. Good response of the crops in this rotation should be obtained by use of phosphorus and potassium and a topdressing of nitrogen in the spring. Soybeans, lespedeza, cowpeas, and winter legumes should receive phosphorus and potassium at planting time. Where a good growth of winter legume is turned under, no fertilizer is needed for corn. When well seeded and fertilized, sericea lespedeza will produce a good yield of hay. Tillage of these soils is restricted, especially in spring, by excess moisture.

These soils produce good pastures. Good management requires practices similar to those for group 6. The pastures should be clipped just before the weed seeds mature to keep the stand of pasture plants pure and to promote the growth of legumes.

GROUP 4

In management group 4 are the imperfectly drained dark-colored soils of the colluvial lands that were derived from materials of limestone origin. The two soils of group 4—Hollywood loam and Hollywood silty clay—are known as black sticky land. They have high contents of lime, plant nutrients, and organic matter and present no serious erosion problem. The soils occupy nearly level areas or slight depressions on gentle slopes and have very slow external and internal drainage. The principal management problems are the maintenance of good tilth and the improvement of drainage. Cultivation is difficult when the soils are either too wet or too dry.

These soils are well suited to corn and certain hay crops. They are wet during the winter and spring and during periods of heavy rainfall. Few winter crops are suited to these soils, because they are too wet. Alfalfa is injured by the high water table during winter and spring, but it may produce well for several years on the more sloping areas. Cotton makes a rank growth and matures late.

Soils of this group are commonly cropped intensively without applications of fertilizers. Their productivity may decline slowly under

this kind of cropping. Applications of phosphorus and potassium probably would increase the yield of corn and hay, but there is no evidence that lime or nitrogen is needed.

These soils can be used safely for intertilled crops in very short rotations; for example, a 2-year rotation consisting of corn and a small grain followed by annual lespedeza or soybeans.

Management requirements.—No special practices of tillage or cropping are necessary to control erosion. On gently sloping areas well-adjusted rotations are effective in providing protection from rapid runoff. Artificial drainage permits earlier spring plowing and, in general, increases yields.

Little permanent pasture is grown on these soils because they are poorly drained and sticky. Permanent pasture grasses and legumes grow well with liberal applications of phosphorus and potassium, but these soils are extremely boggy when wet and are further injured by the trampling of stock.

GROUP 5

The soils of group 5 are the poorly drained strongly acid soils of the stream bottoms, old stream terraces, and depressions. They are:

Atkins silt loam.
Guthrie silt loam.
Johnsburg loam.
Lickdale silt loam.
Robertsville silt loam.
Tyler fine sandy loam.
Tyler silt loam.

Soils of this group are similar to those of group 2 in position and origin but are poorly drained. They are moderately low in plant nutrients and organic matter and are not subject to appreciable erosion. They generally occupy nearly level positions on the first bottoms, on the flat terraces, or in depressions.

Without drainage, the soils of this group are poorly suited to tilled crops. If adequately drained, however, they are suited to small grains, sorghum, soybeans, and possibly corn. Lime benefits all crops. Applications of phosphorus, potassium, and, in some cases, nitrogen will improve hay crops and corn.

No special tillage practices are necessary to control runoff, but some artificial drainage should be provided. In some places the Atkins soil scours during high floods, so it is advisable to plow this soil in spring rather than in the fall. Planting a deep-rooted winter cover crop on this soil furnishes some protection. Most soils of this group are difficult to keep in good tilth; they should be plowed when moisture conditions are favorable.

Management requirements.—Pastures are generally good if the soils are suitably prepared and seeded and they receive liberal applications of lime, phosphorus, and potassium.

GROUP 6

In group 6 are two poorly drained, slightly acid to neutral soils of the stream bottoms derived chiefly from materials of limestone origin. They are Dunning silty clay and Melvin silt loam. They are nearly level and have poor internal drainage. Both soils are sub-

ject to flooding. During rainy seasons they are very wet. The small sinks and holes are often filled with water. Each of these fertile soils has a low lime requirement for crops or pasture. Nevertheless, crop yields are generally low unless artificial drainage has been established. The workability is generally poor to fair. There is virtually no problem of conserving the soils against erosion and leaching of plant nutrients. Parts of the soils on first bottoms are subject to scouring when streams overflow.

Most areas of the Melvin and Dunning soils are poorly suited to tilled crops. Where undrained, they may support fair to very good pasture, but on the very wet areas the grasses are of poor quality. Cultivation is difficult, as the soils clod easily if worked at any except the optimum moisture content. The range of moisture content suitable for tillage is very narrow. The soils will respond to fertilizer, but not so well as most other soils in the county. Lime is ordinarily not needed, even for the more exacting legumes.

Management requirements.—Although the productivity of these soils could be improved by artificial drainage, the cost of installation, the likelihood of obtaining desirable outlets, and the feasibility of changing from pasture to tilled crops should be considered. Artificial drainage should improve the quality of the pasture and make the soils easier to cultivate.

The soils in group 6 produce a fairly good growth of hardwood forest.

GROUP 7

Management group 7 consists of the undulating, moderately permeable, deep soils derived chiefly from materials of limestone origin. Fourteen soils make up this group:

Cumberland silt loam, level phase.
Cumberland silt loam, undulating phase.
Cumberland silty clay loam, eroded undulating phase.
Christian loam, eroded undulating phase.
Christian loam, undulating phase.
Decatur silt loam, undulating phase.
Decatur silty clay loam, eroded undulating phase.
Dewey cherty silt loam, undulating phase.
Dewey cherty silty clay loam, eroded undulating phase.
Dewey silt loam, undulating phase.
Dewey silty clay loam, eroded undulating phase.
Etowah loam, level phase.
Etowah loam, undulating phase.
Etowah silty clay loam, eroded undulating phase.

These are moderately fertile, well-drained soils of the uplands and terraces. They are extensive near Decatur, Priceville, Trinity, and Danville. They absorb and retain moisture. Good tilth is easy to maintain. No soil is subject to serious erosion if it is well managed. All can be farmed with large machinery, including tractors, two-row planters, and cultivators.

Management requirements.—Soils of group 7 are well suited to most crops commonly grown and are important to the agriculture of the county. The Decatur, Dewey, Cumberland, and Etowah soils are among the best in the county for alfalfa. All of the soils in this group respond to good management, which includes use of proper amounts of fertilizer and following 2- or 3-year crop rotations (*2*). Applications

of lime for general farm crops are probably more profitable on Christian soils than on any of the others in this group.

Alfalfa requires careful preparation of the seedbed and, in general, fairly heavy fertilization. The Alabama Experiment Station recommends that a good crop of winter legumes be turned under late in the fall and that the land be fallowed to destroy weed and grass seed and to conserve moisture until planting time. Alfalfa will need lime at planting time and periodic applications of potassium and phosphorus.

The eroded phases of this group of soils require slightly more intensive management than the other soils. It is advisable to use greenmanure crops to raise the content of organic matter and nitrogen and to improve the physical condition of the surface layer. Good stands of alfalfa are difficult to establish on the more eroded soils.

The soils of group 7 can be tilled throughout a relatively wide range of moisture conditions without destruction of the tilth. Tillage should be on the contour where feasible. The soils should not be bare of vegetation for extended periods. Terracing and other engineering methods for runoff control are generally not necessary on the more level phases, if proper management requirements are used. On the more sloping areas measures should be taken to conserve both soil and water.

These soils produce good pasture. The land should be plowed and harrowed thoroughly to form a good seedbed sometime previous to seeding, so the bed will be settled and firm when planted. If pasture is to be seeded in the spring, it may be best to prepare the land in the fall and freshen it with a harrow just before sowing in the spring. Fertilizers may be worked into the soil when the land is prepared, or they may be applied annually. A good seeding mixture is 10 pounds of Dallisgrass, 10 pounds of annual lespedeza, and 2 pounds of white clover. The white clover should be inoculated. On well-prepared land, 5 to 15 pounds of Kentucky bluegrass and 5 to 10 pounds of orchardgrass can be added to the mixture. The seeding should be done in September or the first days of October.

Pastures should be clipped or mowed periodically to eradicate weeds and encourage legumes. Although these soils are desirable for permanent pasture, they produce favorable yields of row crops if well managed. If these soils are used for row crops, imperfectly drained soils such as the Robertsville and Guthrie soils of group 5 can be used for permanent pasture instead of crops.

GROUP 8

In management group 8 are rolling, moderately eroded, deep, moderately permeable soils derived from materials of limestone origin. The soil series of this group are:

Christian loam, eroded rolling phase.
Dewey cherty silty clay loam, rolling phase.
Dewey silty clay loam, eroded rolling phase.

The soils in group 8 are agriculturally similar to those in group 5 but they have a more sloping surface. Most of the acreage has slopes ranging from 5 to 10 percent. In general, soils of this group have a

thin friable silt loam surface layer because erosion has been more active. The cherty Dewey soil has considerable chert throughout the profile, which interferes with tillage. Also, its general level of fertility may be a little lower than that for the other soils in group 8.

Soils of group 8 make good cropland and good to very good pastureland. They are suited to practically all crops commonly grown, although row crops should not be planted so often as on the soils of group 7, chiefly because of the steeper slope and consequent greater susceptibility to erosion. Close-growing hay, pasture, and small grains are particularly well suited.

Where proper fertilization is practiced, a suitable 4- or 5-year rotation consists of 1 year of a row crop and 3 or 4 years of a close-growing crop. A 4- or 5-year rotation thought suitable is cotton or corn, a small grain, and clover and grass for the rest of the period. The grass-clover mixture can be used for hay or pasture. A longer rotation considered satisfactory is cotton or corn for 1 year, a small grain for 1 year, and alfalfa for 3 to 4 years. Other intertilled crops may be planted in the place of the corn or cotton.

Management requirements.—The soils of group 8 require regular fertilization if productivity is to be maintained at a high level. Legume cover crops, used as green manure, help to maintain supplies of the organic matter and nitrogen, but phosphorus and potassium are needed, either in the form of commercial fertilizer or barnyard manure. Moderate applications of lime at regular intervals are needed, particularly for alfalfa and red clover.

Where these soils are kept at a high level of fertility and properly seeded, they support good pasture and have a high carrying capacity. Phosphorus and lime are probably the chief amendments necessary. Pasture mixtures made up of Dallisgrass, annual lespedeza, white clover, and bermudagrass are well suited to these soils. Regular clipping of weeds and other undesirable growth is generally required to keep the pasture cover high in quality. Care to keep surplus vegetation grazed off is as important as avoiding overgrazing.

GROUP 9

Management group 9 consists of rolling, severely eroded soils derived from materials of limestone origin. The following soils are in this group:

Christian clay loam, severely eroded rolling phase.
Cumberland silty clay loam, severely eroded rolling phase.
Decatur silty clay loam, severely eroded rolling phase.
Pearman silty clay loam, severely eroded rolling phase.
Talbott silty clay loam, severely eroded rolling phase.

The soils of this group differ from those of group 8 chiefly in being more severely eroded. Although the slopes of the two groups are between 5 and 10 percent, much of group 9 is probably in the steep part of this range. In general, the friable silt loam surface layer is thin to absent over nearly all the areas, as erosion has been more active than on soils of groups 7 or 8. The plow layer of these soils consists of

firm silty clay loam that has a much less favorable tilth and does not absorb moisture so well as the corresponding layer in soils of groups 7 and 8. Because of the strong slopes and severe erosion, these soils are suited to row crops only if they are grown at very wide intervals.

Management requirements.—These soils are not well suited to row crops. With proper fertilization, seedbed preparation, and seeding they support a good pasture of a fairly high carrying capacity. Phosphorus and lime are probably the chief amendments necessary. Dallisgrass, annual lespedeza, white clover, and bermudagrass are well suited to these soils, provided they are properly fertilized. In some instances kudzu makes an excellent pasture for late summer and early fall. As for other soils suitable for pasture, regular clipping of weeds and other undesirable growth is generally necessary. Overgrazing should be avoided, but the surplus vegetation should be grazed off.

GROUP 10

Management group 10 is made up of rolling, moderately shallow, slowly permeable soils derived chiefly from materials of limestone origin. The eight soils in this group are:

Colbert cherty silt loam, rolling phase.
Colbert loam, eroded rolling phase.
Colbert loam, rolling phase.
Colbert silty clay loam, eroded rolling phase.
Pearman loam, eroded rolling phase.
Talbott cherty silty clay loam, eroded rolling phase.
Talbott loam, eroded rolling phase.
Talbott silty clay loam, eroded rolling phase.

These well-drained soils of the uplands have steeper slopes and are more eroded than the soils in group 11; consequently, it is also more difficult to control runoff and to keep them in good tilth and fertility.

These soils can be conserved in a rotation that includes an intertilled crop once in 3 or 4 years, if other management requirements are met. A rotation of cotton, winter legumes, corn, small grains, and summer hay is well suited. Methods of fertilization of crops are similar to those given for group 7. Crops on all of these soils respond to lime, which is particularly necessary for leguminous crops. Fertilization with green-manure crops or barnyard manure is highly beneficial, especially on the more eroded areas.

Management requirements.—These soils should be terraced and cultivated on the contour to aid in runoff control. They can be tilled under a wide range of moisture content, but the more severely eroded areas should be tilled when moisture conditions are most favorable. Tillage should not be done in the fall, unless a winter cover crop is grown to control runoff. Contour stripcropping is beneficial on the longer slopes.

These soils produce fair pasture if properly managed and terraced. Land preparation, seeding, and fertilizing practices are similar to those used for soils of group 7. Applications of barnyard manure, when available, will help to produce a good pasture sod. Care should be taken not to overgraze newly established permanent pasture until the sod is stable. Weeds should be removed by periodic clipping and mowing before the seeds are scattered.

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GROUP 11

The soils in management group 11—undulating, slowly permeable, moderately shallow, and medium textured—have developed from materials of limestone origin. The soils of this group are the following:

Colbert loam, eroded undulating phase.	Pearman loam, eroded undulating phase.
Colbert loam, undulating phase.	Pearman loam, undulating phase.
Colbert silt loam, level phase.	Talbott loam, eroded undulating phase.
Colbert silt loam, undulating phase.	Talbott silt loam, undulating phase.

The eight soils of this group differ from those of group 7 mainly in being less productive and harder to conserve and in having a tighter and more plastic subsoil. Soils of group 11 have fair to good tilth if they are not eroded so much that subsoil is included in the plow layer. Supplies of plant nutrients are fairly high, but physical characteristics are such that productivity is low. All of these soils have moderate surface drainage. Internal drainage is slow but sufficient for the growing of tilled crops. Under good management, which includes use of properly built terraces and following a good crop rotation, these soils are not subject to serious erosion.

These soils are well suited to most of the crops commonly grown in the county, but they are not so productive as those of group 7. They generally require liberal applications of complete fertilizer and lime if they are used in short rotations.

Management requirements.—Crop rotations and fertilizers used for group 7 soils are suitable for soils of group 11 but probably more green-manure crops should be planted. All of these soils require heavy applications of lime and phosphorus for growing of legumes.

The soils of this group can be tilled under a fairly wide range of moisture conditions without destruction of good tilth. Exceptions are areas where the subsoil is included in the plow layer. Most of the soils should be terraced; tillage should be on the contour; and the soils should not be bare of vegetation for extended periods. In general, these erosive soils require more erosion control practices than those of group 7.

The less eroded and more level soils of group 11 on the more sloping and eroded areas produce fair to good pasture if well managed. The poor quality of the pasture is caused by the thin surface layer and droughtiness. Seeding and fertilization methods for permanent pasture are similar to those used for group 7. Care should be exercised to avoid overgrazing, and periodic clipping or mowing will be needed to eradicate weeds.

GROUP 12

There are two soils in management group 12—Colbert silty clay loam, eroded undulating phase, and Talbott silty clay loam, eroded undulating phase. They are slowly permeable, moderately shallow, moderately fine textured soils derived from materials of limestone origin.

The soils have a smooth or undulating surface, a plastic subsoil, and moderately shallow depth to limestone bedrock. Their plow layer has a heavier consistence than the corresponding layer in the soils of group 11. Their entire profile is medium to strongly acid. The soils are low in fertility and moderate to low in productivity. Because of their plastic clayey consistence, moisture relations are less favorable than for soils of group 8. Their workablity is fair to poor. It varies according to the amount of surface soil that has been lost through erosion. The more eroded parts have a surface layer of finer texture, heavier consistence, and accordingly less favorable tilth. Erosion is somewhat of a hazard. Clods will form if the soils are tilled when too wet. Plant nutrients are retained only fairly well, even where losses by erosion are minimized.

Management requirements.—These soils make only fair to poor cropland, but fair to good pastureland if properly managed. Because of their erodibility and unfavorable tilth, they are probably better suited to small grains, hay, and pasture than to row crops such as corn and cotton. Moderately long to long rotations should be used, as it is necessary to keep the soils under close-growing cover as much of the time as possible. When row crops are grown, they should be followed directly by a cover crop. Small grains, such as oats and wheat, and legumes, such as red clover, alfalfa, sericea lespedeza, and annual lespedeza, are fairly well suited.

These soils are not well suited for truck crops because they are not so easily worked or cultivated as some of the more loamy soils. Root crops cannot be expected to develop well. Organic matter, plant nutrients, and lime should be replenished regularly. It is particularly important that organic matter be maintained at a high level, because tilth and moisture-holding capacity are especially benefited by it. Since shallow-rooted crops are adversely affected by long dry periods, deeper rooted hay crops such as alfalfa, red clover, sericea lespedeza, and sweetclover may do better. Practically all areas of these soils require fertilizers and lime if legumes are to be grown successfully.

Where a high state of fertility is maintained, common pasture plants such as bermudagrass, Kentucky bluegrass, Dallisgrass, annual lespedeza, orchardgrass, and white clover do well. During the long dry periods in midsummer and early fall, pasture commonly dries out sooner on these soils than on those with thicker uneroded surface layers.

GROUP 13

In management group 13 are hilly, slowly permeable soils derived from materials of limestone origin. The soils in this group are:

Colbert loam, hilly phase.
Dewey silty clay loam, eroded hilly phase.
Talbott cherty silty clay loam, eroded hilly phase.
Talbott silty clay loam, eroded hilly phase.

The four soils of this group occupy hilly relief and generally occur at the base of limestone slopes. They are poorly suited to tilled crops because of their slope, heavy subsoil, and eroded condition.

They are poor to fair for pasture. Crops are damaged during dry periods, and the soil tilth is very poor. Runoff is rapid, so moisture absorption is low. All of the soils in this group are probably deficient in lime, phosphorus, nitrogen, and potassium. Liberal applications of these should be made for the production of any crop.

Management requirements.—Although these soils can be used under careful management for growing tilled crops, they are probably better suited to permanent pasture or forest. For pastures, land preparation, seeding, and fertilization are similar to those for group 7. Overgrazing should be avoided, as it will impair the tilth and damage the pasture sod. Areas left bare of vegetation are subject to sheet and gully erosion. Weeds and brush can be controlled by occasional mowing.

GROUP 14

In management group 14 are undulating permeable soils derived chiefly from materials of sandstone origin. They are:

Allen fine sandy loam, eroded undulating phase.
Allen fine sandy loam, undulating phase.
Crossville loam, undulating phase.
Enders loam, eroded undulating phase.
Enders loam, undulating phase.
Hanceville fine sandy loam, eroded undulating phase.
Hanceville fine sandy loam, undulating phase.
Hartsells fine sandy loam, eroded undulating phase.
Hartsells fine sandy loam, undulating phase.
Hartsells fine sandy loam, undulating shallow phase.
Hartsells loam, undulating phase.
Holston fine sandy loam, eroded undulating phase.
Holston fine sandy loam, level phase.
Holston fine sandy loam, undulating phase.
Holston gravelly fine sandy loam, eroded undulating phase.
Holston gravelly fine sandy loam, undulating phase.
Jefferson fine sandy loam, eroded undulating phase.
Jefferson fine sandy loam, undulating phase.
Linker fine sandy loam, eroded undulating phase.
Linker fine sandy loam, undulating phase.
Nolichucky fine sandy loam, eroded undulating phase.
Nolichucky fine sandy loam, undulating phase.
Nolichucky gravelly fine sandy loam, eroded undulating phase.
Sequatchie fine sandy loam.
Sequatchie fine sandy loam, eroded phase.
Tilsit silt loam, eroded undulating phase.
Tilsit silt loam, level phase.
Tilsit silt loam, undulating phase.
Waynesboro fine sandy loam, eroded undulating phase.
Waynesboro fine sandy loam, undulating phase.

These undulating or gently sloping well-drained sandy soils of the uplands, colluvial lands, and terraces are similar to those of group 7 in slope and drainage but differ in being of sandstone and shale origin. They absorb water and are easily kept in good tilth. They are lower in plant nutrients and organic matter than soils of group 7. All of the soils of group 14 have good external and internal drainage. No soil is subject to serious erosion under good management.

The 30 soils in this group are well suited to most of the crops grown in the county. If other management requirements are met, they can be conserved in a rotation that includes an intertilled crop once in 2 or 3 years. They need applications of a complete fertilizer if produc-

tion is to be kept high, and if they are intensively tilled they should be limed.

Management requirements.—A rotation that consists of cotton, winter legumes, corn, a small grain, and summer hay may be used successfully. In this rotation, peanuts may be substituted for cotton. Crops in this rotation will respond well if fertilizer is applied.

The soils of this group can be worked at a wide range of moisture conditions without destruction of good tilth. Tillage should be on the contour where feasible, and the soils should not be bare of vegetation for long periods. One-row tractors, planters, and cultivators can be used. Terracing and other engineering methods for runoff control are necessary, even though other good management is practiced.

These soils produce fair pasture. On these soils the methods of land preparation, fertilization, and seeding for permanent pasture are similar to those used for soils of group 7. Pastures should not be overgrazed, especially the newly established ones. They should be clipped or moved periodically to eradicate undesirable plants.

GROUP 15

The soils in management group 15 are rolling, permeable, nonstony, and uneroded. They were derived chiefly from materials of sandstone origin. The soils are the following:

Allen fine sandy loam, eroded rolling phase.
Allen fine sandy loam, rolling phase.
Enders loam, eroded rolling phase.
Enders loam, rolling phase.
Hanceville fine sandy loam, eroded rolling phase.
Hartsells fine sandy loam, eroded rolling phase.
Hartsells fine sandy loam, eroded rolling shallow phase.
Hartsells fine sandy loam, rolling phase.
Hartsells fine sandy loam, rolling shallow phase.
Holston gravelly fine sandy loam, eroded rolling phase.
Holston gravelly fine sandy loam, rolling phase.
Jefferson fine sandy loam, eroded rolling phase.
Jefferson fine sandy loam, rolling phase.
Linker fine sandy loam, eroded rolling phase.
Linker fine sandy loam, rolling phase.
Nolichucky gravelly fine sandy loam, eroded rolling phase.
Nolichucky gravelly fine sandy loam, rolling phase.
Tilsit silt loam, eroded rolling phase.
Tilsit silt loam, rolling phase.
Waynesboro fine sandy loam, eroded rolling phase.

These rolling or sloping well-drained soils of the uplands, colluvial lands, and terraces differ from the soils of group 14 principally in having steeper slopes and in being more generally eroded. The problems of runoff control, maintenance of good tilth, and increase and maintenance of plant nutrients and organic matter are greater on these soils than on the soils of group 14.

Management requirements.—These soils can be conserved in a rotation that includes an intertilled crop once in 3 or 4 years, if other management requirements are met. The rotation and fertilization methods suggested for group 14 are applicable in a large measure to the soils of group 15. Yields cannot be expected to be quite so high on these soils because runoff cannot be controlled so well on these rolling or sloping soils as on the more level areas.

Tillage should be on the contour and can be performed throughout a wide range of moisture content without destruction of good tilth. Considerable care must be taken to till the eroded areas under more favorable moisture conditions than are necessary for the uneroded soils. Fall plowing should be avoided unless a winter cover crop is grown to aid in controlling runoff. Terracing is advisable for all these soils, whether they are used for intertilled or permanent cover crops.

These soils produce fair to good pasture if properly managed. Good pasture management should be similar to that described for the soils of group 14, but application of manure aids in establishing a good pasture sod on eroded areas.

GROUP 16

Management group 16 consists of hilly, permeable nonstony soils derived chiefly from materials of sandstone origin. The 10 soils in management group 16 are as follows:

Allen fine sandy loam, eroded hilly phase.
Allen fine sandy loam, hilly phase.
Allen fine sandy loam, severely eroded hilly phase.
Hector fine sandy loam, eroded hilly phase.
Hector fine sandy loam, hilly phase.
Hector fine sandy loam, severely eroded hilly phase.
Linker fine sandy loam, eroded hilly phase.
Muskingum fine sandy loam, eroded hilly phase.
Muskingum fine sandy loam, hilly phase.
Nolichucky gravelly fine sandy loam, hilly phase.

These hilly well-drained soils of the uplands, colluvial lands, and high terraces differ from the soils of group 15 chiefly in occupying steeper slopes and in being generally more eroded. It is much more difficult to conserve the soils of this group than those of group 15, and they are also lower in productivity. Because of their steep slopes and present degree of erosion, nearly all of these soils are highly susceptible to further erosion.

Management requirements.—These soils are poor for tilled crops and fairly poor for pasture. On farms where it it necessary to grow crops on these soils, the crop rotations should be long and carefully selected to control runoff and maintain productivity. Stripcropping and contour tillage should be considered, and vegetation should be kept on the land as much of the time as possible. These soils are much better suited to pasture or forest and should be used for those purposes wherever possible.

All of the soils of this group are acid; they are also deficient in phosphorus, potassium, and nitrogen. The soils are hilly and, if used for pasture, should be kept under a good sod. Lime and fertilizers are effective in producing a good growth. Legumes should be planted among the other pasture plants to improve the quality of feed and to assist in maintaining supplies of nitrogen in the soil. The amounts of lime and fertilizers needed for optimum pasture production vary among the different soils of the group, and also according to previous

treatments. The amount of legumes in the pasture herbage affects the quantity of nitrogen to be applied.

Although most of the soils are hilly, mowing machines can be used for clipping the pastures. It is important to avoid overgrazing, particularly during the periods of low rainfall. In most places pastures will have to be obtained by seeding. Land preparation, fertilization, and seeding of permanent pasture on these soils are similar to those given for group 7.

Kudzu is a valuable crop for hay, temporary grazing, erosion control, and soil building. It does well on these soils if properly planted and fertilized. The fertilizer should be applied when preparing the land for planting. On land that can be plowed kudzu should be planted in rows in about the same manner as for cotton. If the land cannot be plowed, it can be planted in hills at desired spacing. Crowns may be planted 10 feet apart in rows 10 feet apart. If plenty of crowns or plants are available, spacing may be much closer. Planting time runs from about the first of March to not later than March 15. The kudzu should be well established before it is grazed. Avoid overgrazing, particularly during periods of low rainfall.

GROUP 17

In management group 17 are the hilly and rolling permeable stony soils derived chiefly from materials of sandstone origin. This group is composed of the following soils:

Allen stony fine sandy loam, eroded rolling phase.
Allen stony fine sandy loam, hilly phase.
Hector stony fine sandy loam, eroded hilly phase.
Hector stony fine sandy loam, hilly phase.
Muskingum stony fine sandy loam, eroded hilly phase.
Muskingum stony fine sandy loam, hilly phase.
Muskingum stony fine sandy loam, rolling phase.
Pottsville shaly silt loam, eroded hilly phase.
Pottsville shaly silt loam, hilly phase.

The soils of group 17 are permeable to roots and moisture but have low to moderate fertility. Some are moderately deep to bedrock but others are shallow. All are stony, and some are moderately eroded. Except for the stoniness, the tilth of the plow layer is good. The natural productivity for tilled crops is low to fair. The workability is poor to fair, chiefly because of their strong slopes and stoniness. Practically all of these soils are difficult to conserve against erosion. They have less capacity to retain plant nutrients than the soils of groups 8 and 9. In general, permanent pasture is thought to be best suited to these soils.

Management requirements.—As for soils of group 15, good management requires that these soils be under a permanent close-growing cover most or all of the time. A mixture of Dallisgrass, annual lespedeza, and white clover is suitable for seeding pastures. At least moderate applications of nitrogen, phosphorus, potassium, and lime are necessary to establish a good pasture sod. Kudzu and sericea lespedeza

are suited to these soils and may be particularly good crops for the least productive areas.

Where some acreage of these soils is needed for row crops, very long rotations consisting chiefly of close-growing crops are required. Suitable is a long rotation consisting of 1 year of corn, a small grain, and then hay or pasture for 3 or 4 years. A close- growing cover should be established as soon as possible after a row crop is harvested. Legume cover crops to be plowed under as green manure are as beneficial for these soils as for those of group 15.

GROUP 18

In management group 18 are rolling, permeable, nonstony severely eroded soils derived chiefly from materials of sandstone origin. They are the following:

Allen fine sandy loam, severely eroded rolling phase.
Hanceville loam, severely eroded rolling phase.
Linker loam, severely eroded rolling phase.
Tilsit clay loam, severely eroded rolling phase.
Waynesboro fine sandy loam, severely eroded rolling phase.

These severely eroded soils of the uplands, colluvial lands, and terraces occur in the limestone valleys and on sandstone plateaus. They absorb little moisture because runoff is difficult to control and tilth has been greatly impaired by erosion. It is difficult to keep supplies of plant nutrients and organic matter at a high level.

These soils can be conserved only by the use of close-growing crops and other strict conservation practices. Small grains, sericea lespedeza, kudzu, and other close-growing crops should be planted for grazing and soil conservation, especially during the first 5 or 6 years or more. Furthermore, the crops, especially kudzu and sericea lespedeza, should be well established before they are grazed. Liberal applications of a complete fertilizer and lime should be used. After several years of permanent cover, a rotation that includes an intertilled crop once in 4 or 5 years may be used if other management requirements are met.

Management requirements.—When used for cultivated crops, these soils should be terraced, and then tilled on the contour to aid in control of runoff. All soils except the Tilsit can be tilled throughout a fairly wide range of moisture content without destroying good tilth. Tillage should not be done in the fall unless a winter cover crop is grown to control erosion.

These soils now produce poor pasture but, with careful management for several years, would provide fair to good grazing. Close-growing crops such as kudzu, should be grown several years before an attempt is made to seed permanent pasture. After kudzu is well established it may be grazed, but care should be taken to avoid overgrazing.

GROUP 19

Management group 19 is made up of uneroded, steep shallow stony soils and severely eroded hilly shallow stony soil. All are derived from materials of sandstone and shale origin. The soils are:

Hector stony fine sandy loam, steep phase.
Muskingum stony fine sandy loam, steep phase.
Pottsville shaly silt loam, severely eroded hilly phase.
Pottsville shaly silt loam, steep phase.

The soils of this group are hilly, steep, and stony. Practically all of them are in or near the mountainous areas of the county. The soils are definitely not suitable for crops and very poor for pasture.

Management requirements.—Most of these soils are in forest and probably should remain in this use. Nonforested areas are severely eroded and should be revegetated as rapidly as practicable. Pines and kudzu are probably among the plants suitable for revegetating the severely eroded areas.

Advice of the extension forester should be sought regarding methods of planting and managing forests on these soils.

Although the soils of this group are not suitable for crops and pasture, some farmers have to use some of them for these purposes because they do not have enough acreage of better soils to provide the crops or pasture they need for a living. Where tilled crops must be grown, adequate lime and fertilizers should be applied and the organic-matter content should be maintained at a high level. Hay, pasture, and small grain crops will have to dominate in the crop rotations.

If the productivity these soils have is to be kept, as much moisture as possible will have to be held in the soil. As luxuriant a vegetative cover as possible must be kept growing, or the soil material will wash away. All field operations should be done on the contour. On the longer slopes stripcropping may be beneficial. These land types are not suitable for terracing.

Productive pasture requires proper seeding, liming, and fertilizing, particularly with phosphorus. Legumes should make up a considerable part of the pasture sod. Applying fertilizer and other amendments and the clipping of weedy growth are difficult on these steep land types.

GROUP 20

In management group 20 are the smooth and rolling stony and cobbly land types derived from limestone and sandstone materials. The land types are the following:

Cobbly colluvium (Jefferson soil material).
Stony rolling land (Talbott and Colbert soil materials).
Stony smooth land (Talbott and Colbert soil materials).

The two stony land types are shallow to limestone bedrock and have numerous rock outcrops. The cobbly colluvium is a mixture of

cobblestones, gravel, and soil material derived from sandstone and shale. The slopes of all these land types range from nearly level to rolling. All have stones and rock outcrops that materially interfere with or prohibit tillage.

Management requirements.—Natural productivity is low, chiefly because the clayey or very sandy materials do not hold much moisture for plants. In most areas runoff is high and erosion is difficult to control. Good tilth is also difficult to maintain. The range of moisture content suitable for tillage is very narrow. Row crops are not suited to these land types, but where fertility is at a high level many of the legumes and grasses are fairly productive. Yields of all crops, however, are restricted by droughtiness.

Much of the land in management group 20 is best used for permanent pasture or forest. Where some acreage is required for row crops and the land is sufficiently free of stones and rock outcrops, moderately long rotations should be used. Large yields cannot be expected from most row crops. There is not enough moisture available during the drier parts of the growing period. Fall-sown small grains and other early maturing crops consistently give good yields.

Regular fertilization and liming and the incorporation of organic matter are necessary to maintain fairly good productivity. Where fertility is kept at a fairly high level, alfalfa and red clover are fairly well suited to the better areas derived from limestone materials.

In general, the members of this group are suited to the more desirable pasture plants, but they require adequate fertilization, liming, and proper seeding. Where fertility is at a fairly high level, bermudagrass, annual lespedeza, white clover, and bluegrass are among the better pasture plants.

GROUP 21

In management group 21 are the following miscellaneous land types:

Limestone rockland, rolling.
Limestone rockland, rough.
Rough gullied land (Decatur and Cumberland soil materials).
Rough gullied land (Linker and Hartsells soil materials).
Stony rough land (Muskingum soil material).

These land types are not suitable for tilled crops or pasture. Steepness of slope, stoniness, severe erosion, and an inadequate supply of humus prohibit the growing of crops and pasture. These land types are best suited to forest. A part of the acreage is now covered with oak, hickory, cedar, and a few pines.

Management requirements.—Where these land types are not forested, a suitable cover may establish itself if it is properly protected from fire and grazing. In some places, planting will be necessary. Shortleaf pine is one of the trees that most frequently establishes itself on cleared areas. It is also one of the trees best for planting, especially on the less fertile soils and on the more exposed or otherwise unfavorable sites. Virginia pine is suited to the most exposed or most infertile

site but it grows slowly and has less commercial value than shortleaf pine. Loblolly pine is better suited to moist sites than shortleaf pine. Shortleaf pine is best for the sandy places characteristic of the sandstone plateaus. Where moisture relations most favor plant growth and the soil material is fairly fertile, yellow-poplar, walnut, locust, and other deciduous trees may be more desirable. For additional information on forest management, see the section Forests.

ESTIMATED YIELDS

Table 6 gives estimated yields to be expected from various crops grown in the county. In columns A are yields to be expected under ordinary management, and in columns B, yields under the best practical management the farmers in the county could be expected to follow.

The yields in columns A are based largely on observations made by the survey party and the experience of local farmers and agricultural workers. Where available, crop yield data by soil type, and extending over a period of years, were used in making the estimates.

The yields in columns B are to be expected under better management than that commonly practiced at the time of survey. Good management refers to the proper choice and rotation of crops; the correct use of lime, commercial fertilizers, and manure; use of proper tillage methods; the return of organic matter to the soil; and the use of engineering methods of water control, where necessary. The estimates are based largely on the judgment of men who have had experience with the soils and crops of the county and who can anticipate the responses these crops will make if known deficiencies of the soils are corrected to the extent practical farming will permit. The various deficiencies and strong points of the soils are discussed in the section, Use and Management of Morgan County Soils, where the soils are placed in 21 management groups and the management needs of each group are given.

The yields listed in columns B can be thought of as production goals that may be reached generally by using all feasible practices of soil and crop management. The same goal probably can be reached on most soils by more than one combination of management practices. Some practices may supplement or replace others, whereas certain practices are essential and should not be omitted. The best choice of a sound management program for an individual farm is based on the whole farm organization. On one farm it may be feasible and desirable to manage a soil in such a way that the yield of a given crop exceeds the goal, but on another farm circumstances may be such that for another crop it would be more practical and profitable not to reach the goal.

The yields listed in column B, when compared with those listed in column A, will give an idea of the response that may be expected when a good, practical system of soil management is followed.

TABLE 6.—*Estimated average acre yields of principal crops to be management, and the productivity and*

[Yields in columns A to be expected under the ordinary management practiced in best practical management most farmers in the county could follow; blank specified]

Soils	Cotton (lint)		Corn		Wheat		Soybean hay	
	A	B	A	B	A	B	A	B
	Lbs.	*Lbs.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*
Abernathy silt loam	350	500	45	80	[4]14	20	2. 2	3. 5
Abernathy fine sandy loam	300	500	30	65	14	20	2. 0	3. 0
Allen fine sandy loam, undulating phase.	370	600	28	50	17	24	2 0	3. 2
Allen fine sandy loam, eroded undulating phase.	360	580	25	50	16	23	1. 9	3. 2
Allen fine sandy loam, rolling phase	330	520	24	50	15	22	1. 8	2. 9
Allen fine sandy loam, eroded rolling phase.	310	500	23	48	14	20	1. 7	2. 8
Allen fine sandy loam, severely eroded rolling phase.[6]	160	380	10	30		18	. 7	2. 0
Allen fine sandy loam, hilly phase	200	380	12	35		18	1. 5	2. 5
Allen fine sandy loam, eroded hilly phase.	180	360	11	30		16	1. 2	2. 2
Allen fine sandy loam, severely eroded hilly phase.[6]		320	8	25		17	. 5	1. 8
Allen stony fine sandy loam, eroded rolling phase.		380	17	30				
Allen stony fine sandy loam, hilly phase.		320	15	28				2. 0
Atkins silt loam[7]				45		20	1. 9	3. 0
Barbourville fine sandy loam	350	550	28	65	[4]14	25	2. 0	3. 0
Bruno loamy fine sand			15	40	10	15	1. 0	1. 5
Captina and Capshaw silt loams, undifferentiated.	300	500	28	55	14	20	2. 0	3. 2
Captina and Capshaw loams, undifferentiated.	300	500	28	55	14	20	2. 0	3. 2
Christian loam, undulating phase	310	500	28	50	17	24	2. 0	3. 2
Christian loam, eroded undulating phase.	300	480	26	48	16	23	1. 9	3. 0
Christian loam, eroded rolling phase.	250	400	22	40	14	20	1. 7	2. 8
Christian clay loam, severely eroded rolling phase.	150	360	10	28		17	. 6	1. 9
Cobbly colluvium (Jefferson soil material).[7]			10	15				
Colbert silt loam, level phase	160	400	16	38	10	20	1. 6	2. 7
Colbert silt loam, undulating phase	180	320	14	32	10	19	1. 5	2. 6
Colbert loam, undulating phase	180	300	14	32	9	20	1. 5	2. 6
Colbert loam, eroded undulating phase.	160	350	14	32	9	18	1. 5	2. 6
Colbert loam, rolling phase	160	340	14	28	8	16	1. 3	2. 6
Colbert loam, eroded rolling phase	140	310	13	26	8	15	1. 2	2. 0
Colbert loam, hilly phase							. 5	1. 8
Colbert silty clay loam, eroded undulating phase.	160	350	13	26	9	18	1. 5	2. 6
Colbert silty clay loam, eroded rolling phase.	120	300	10	20	7	15	1. 2	2. 0

See footnotes at end of table.

expected on the soils of Morgan County, Ala., under two levels of workability for each soil

the county at the time of survey; yields in columns B to be expected under the spaces indicate crop ordinarily is not grown on the soil at the level of management

Lespedeza hay		Alfalfa hay		Potatoes		Permanent pasture		Productivity [1]	Workability [2]
A	B	A	B	A	B	A	B		
Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Cow-acre-days* [3]	*Cow-acre-days* [3]		
1.3	1.8	[5]3.1	4.0	130	190	160	240	Very high	Very good.
1.1	1.7	[5]2.5	3.4	140	200	140	215	Medium	Excellent.
.9	1.4	2.2	3.2	110	190	90	180	High	Excellent.
.8	1.4	2.1	3.2	100	180	80	160	Medium	Very good.
.6	1.4	2.1	3.3	80	130	75	170	High	Very good.
.5	1.3	2.0	3.1	75	110	70	150	Medium	Very good.
.4	1.0	-----	2.7	----	100	40	110	Low	Fair.
.5	1.2	-----	-----	----	100	45	120	Medium	Good.
.4	1.0	-----	-----	60	90	40	110	Medium	Fair.
.3	.8	-----	-----	----	65	35	100	Low	Fair.
.3	1.0	-----	-----	----	-----	35	100	Low	Fair.
.4	.9	-----	-----	----	-----	25	75	Medium	Fair.
.9	1.7	-----	-----	----	120	100	200	Low	Fair.
.9	1.6	[5]2.0	3.0	120	200	70	170	Medium	Very good.
.7	.9	-----	-----	90	170	60	100	Low	Very good.
.9	1.7	-----	-----	80	120	100	195	Medium	Good.
.9	1.7	-----	-----	85	130	100	195	Medium	Good.
.8	1.3	2.2	3.2	100	180	90	160	Medium	Good.
.7	1.1	2.2	3.2	90	170	80	140	Medium	Good.
.5	1.1	2.0	3.1	70	110	65	110	Medium	Good.
.3	1.0	-----	2.5	----	-----	50	80	Low	Poor.
-----	-----	-----	-----	----	-----	25	50	Low	Poor.
1.0	1.2	2.0	2.8	----	-----	75	140	Medium	Poor.
1.0	1.1	1.4	2.6	----	-----	70	130	Medium	Poor.
1.0	1.1	1.4	2.6	----	-----	60	120	Medium	Fair.
.5	1.0	1.2	2.4	----	-----	75	135	Low	Poor.
.4	.9	1.1	2.3	----	-----	55	110	Low	Fair.
.4	.9	1.0	2.3	----	-----	50	110	Low	Poor.
.3	.8	-----	-----	----	-----	35	90	Low	Poor.
.5	1.0	1.2	2.4	----	-----	60	120	Low	Poor.
.4	.9	1.0	2.3	----	-----	40	100	Low	Poor.

TABLE 6.—*Estimated average acre yields of principal crops to be management, and the productivity and*

[Yields in columns A to be expected under the ordinary management practiced in best practical management most farmers in the county could follow; blank specified]

Soils	Cotton (lint)		Corn		Wheat		Soybean hay	
	A	B	A	B	A	B	A	B
	Lbs.	*Lbs.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*
Colbert cherty silty loam, rolling phase.	180	340	14	28	8	16	1. 2	2. 1
Cotaco loam [7]	----	----	35	65	----	20	2. 0	3. 0
Crossville loam, undulating phase	300	500	30	65	15	28	2. 0	3. 0
Cumberland silt loam, level phase	400	600	35	60	19	27	2. 1	3. 1
Cumberland silt loam, undulating phase.	400	600	32	58	19	26	2. 0	3. 0
Cumberland silty clay loam, eroded undulating phase.	400	560	30	58	18	25	1. 9	2. 9
Cumberland silty clay loam, severely eroded rolling phase.	325	475	----	40	----	18	1. 0	2. 1
Decatur silt loam, undulating phase.	400	600	32	58	19	26	2. 0	3. 0
Decatur silty clay loam, eroded undulating phase.	400	560	30	58	18	25	1. 9	2. 9
Decatur silty clay loam, severely eroded rolling phase.	325	475	----	40	----	18	1. 0	2. 9
Dewey silt loam, undulating phase	400	600	35	60	19	27	2. 1	3. 2
Dewey silty clay loam, eroded rolling phase.	350	550	28	50	15	22	1. 8	2. 9
Dewey silty clay loam, eroded undulating phase.	400	570	33	60	18	25	2. 0	3. 1
Dewey silty clay loam, eroded hilly phase.	180	360	11	30	8	16	1. 2	2. 2
Dewey cherty silt loam, undulating phase.	340	600	28	50	17	24	2. 0	3. 2
Dewey cherty silty clay loam, eroded undulating phase.	320	580	25	50	16	23	1. 9	3. 2
Dewey cherty silty clay loam, eroded rolling phase.	270	500	23	48	14	20	1. 7	2. 8
Dunning silty clay [7]	----	----	20	45	----	----	1. 7	3. 0
Egam silty clay loam	280	400	35	55	[4] 13	18	1. 8	2. 5
Enders loam, undulating phase	360	480	30	54	16	24	1. 7	2. 7
Enders loam, eroded undulating phase.	350	460	28	52	16	24	1. 7	2. 7
Enders loam, rolling phase	300	400	25	48	12	20	1. 5	2. 4
Enders loam, eroded rolling phase	280	380	24	46	12	20	1. 4	2. 3
Etowah loam, level phase	450	600	38	64	19	27	2. 1	3. 2
Etowah loam, undulating phase	400	600	35	60	19	27	2. 1	3. 2
Etowah silty clay loam, eroded undulating phase.	400	570	33	60	18	25	2. 0	3. 1
Guthrie silt loam [7]	----	----	----	40	----	22	1. 0	2. 8
Hanceville fine sandy loam, undulating phase.	450	600	28	50	17	24	2. 0	3. 2
Hanceville fine sandy loam, eroded undulating phase.	430	600	25	50	16	23	1. 9	3. 2
Hanceville fine sandy loam, eroded rolling phase.	270	500	23	48	14	20	1. 7	2. 8

See footnotes at end of table.

expected on the soils of Morgan County, Ala., under two levels of workability for each soil—Continued

the county at the time of survey; yields in columns B to be expected under the spaces indicate crop ordinarily is not grown on the soil at the level of management

Lespedeza hay		Alfalfa hay		Potatoes		Permanent pasture		Productivity [1]	Workability [2]
A	B	A	B	A	B	A	B		
Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Cow-acre-days* [3]	*Cow-acre-days* [3]		
0.4	1.0	1.1	2.3	----	----	40	100	Low	Poor.
.9	1.6	----	----	120	200	50	190	Medium	Good.
.8	1.6	----	----	120	200	120	180	Medium	Very good.
1.2	1.9	2.8	3.9	120	200	120	200	Very high	Very good.
1.1	1.7	2.7	3.7	120	200	110	190	Very high	Very good.
.9	1.6	2.6	3.5	100	200	90	180	High	Good.
.5	1.3	----	2.5	----	----	40	125	Low	Fair.
1.1	1.7	2.7	3.8	120	200	110	190	Very high	Good.
.9	1.6	2.6	3.5	100	200	100	180	Medium	Good.
.5	1.3	----	2.5	----	----	40	125	Low	Poor.
1.2	1.9	3.0	4.0	120	230	110	190	Very high	Very good.
.8	1.6	2.4	3.2	80	120	70	170	Medium	Fair.
1.0	1.8	2.8	3.6	100	200	90	180	High	Good.
.4	1.0	----	----	----	----	50	140	Medium	Poor.
.9	1.4	2.2	3.2	110	190	100	180	Medium	Fair.
.8	1.4	2.1	3.2	100	180	80	175	Medium	Fair.
.5	1.3	2.0	3.1	75	110	60	160	Medium	Fair.
.7	1.5	----	----	----	----	120	200	Low	Poor.
1.2	1.6	----	----	----	----	100	160	High	Fair.
.7	1.3	2.0	3.0	100	180	80	175	Medium	Excellent.
.7	1.2	1.9	2.9	90	170	75	170	High	Very good.
.6	1.1	1.7	2.6	80	150	70	160	High	Very good.
.5	1.0	1.5	2.2	70	130	55	140	Medium	Good.
1.2	1.9	3.0	4.0	120	230	120	220	Very high	Very good.
1.2	1.9	3.0	4.0	120	230	110	200	Very high	Very good.
1.0	1.8	2.8	3.8	100	200	100	200	High	Good.
.6	1.4	----	----	----	190	100	200	Low	Fair.
.8	1.5	2.2	3.4	110	190	90	180	High	Excellent.
.8	1.5	2.4	3.3	100	180	80	160	Medium	Very good.
.5	1.3	2.0	3.1	75	110	70	150	Medium	Good.

TABLE 6.—*Estimated average acre yields of principal crops to be management, and the productivity and*

[Yields in columns A to be expected under the ordinary management practiced in best practical management most farmers in the county could follow; blank specified]

Soils	Cotton (lint)		Corn		Wheat		Soybean hay	
	A	B	A	B	A	B	A	B
	Lbs.	*Lbs.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*
Hanceville loam, severely eroded rolling phase.	160	380	10	30	---	18	0. 7	2. 0
Hartsells fine sandy loam, undulating phase.	450	625	30	60	15	22	2. 0	3. 0
Hartsells fine sandy loam, eroded undulating phase.	430	625	28	60	15	22	2. 0	3. 0
Hartsells fine sandy loam, rolling phase.	380	560	25	50	12	20	1. 8	2. 7
Hartsells fine sandy loam, eroded rolling phase.	360	550	24	48	12	20	1. 7	2. 6
Hartsells fine sandy loam, undulating shallow phase.	360	500	23	46	11	18	1. 4	2. 3
Hartsells fine sandy loam, rolling shallow phase.	325	420	20	42	9	16	1. 1	1. 9
Hartsells fine sandy loam, eroded rolling shallow phase.	310	400	18	40	9	16	1. 0	1. 6
Hartsells loam, undulating phase	460	625	30	60	15	22	2. 0	3. 0
Hector fine sandy loam, hilly phase	---	---	---	---	---	---	---	---
Hector fine sandy loam, eroded hilly phase.	---	---	---	---	---	---	---	---
Hector fine sandy loam, severely eroded hilly phase.[6]	---	---	---	---	---	---	---	---
Hector stony fine sandy loam, hilly phase.[6]	---	---	---	---	---	---	---	---
Hector stony fine sandy loam, eroded hilly phase.[6]	---	---	---	---	---	---	---	---
Hector stony fine sandy loam, steep phase.[6]	---	---	---	---	---	---	---	---
Hollywood silty clay [7]	220	320	30	45	15	30	1. 9	2. 2
Hollywood loam [7]	240	340	32	48	15	30	2. 0	2. 4
Holston fine sandy loam, level phase.	400	550	30	60	15	22	2. 0	3. 0
Holston fine sandy loam, undulating phase.	400	550	28	56	15	22	1. 9	2. 9
Holston fine sandy loam, eroded undulating phase.	400	540	26	56	14	20	1. 9	2. 9
Holston gravelly fine sandy loam, undulating phase.	380	510	24	50	13	19	1. 8	2. 7
Holston gravelly fine sandy loam, eroded undulating phase.	380	500	24	54	12	17	1. 7	2. 6
Holston gravelly fine sandy loam, rolling phase.	320	450	20	46	10	17	1. 7	2. 6
Holston gravelly fine sandy loam, eroded rolling phase.	310	440	20	46	9	16	1. 6	2. 5
Huntington silt loam	[4] 320	500	40	70	[4] 16	23	2. 5	3. 3
Huntington fine sandy loam, sanded phase.	[4] 320	520	35	65	14	22	2. 2	3. 0

See footnotes at end of table.

expected on the soils of Morgan County, Ala., under two levels of workability for each soil—Continued

the county at the time of survey; yields in columns B to be expected under the spaces indicate crop ordinarily is not grown on the soil at the level of management

Lespedeza hay		Alfalfa hay		Potatoes		Permanent pasture		Productivity [1]	Workability [2]
A	B	A	B	A	B	A	B		
Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Cow-acre-days* [3]	*Cow-acre-days* [3]		
0.4	1.0	-----	2.7	----	100	40	110	Low--------	Fair.
.8	1.5	2.5	3.5	125	200	70	150	High--------	Excellent.
.8	1.5	2.5	3.5	125	200	65	150	High--------	Very good.
.7	1.3	2.0	2.9	100	180	60	140	High--------	Very good.
.7	1.2	1.8	2.8	100	170	60	135	Medium-----	Good.
.7	1.2	-----	-----	100	170	65	135	Medium-----	Very good.
.5	1.0	- -	-	- - -	-----	50	130	Medium-----	Very good.
.5	1.0	-----	-----	----	-----	50	130	Low--------	Fair.
.8	1.5	2.5	3.5	125	200	90	180	High--------	Excellent.
.3	.5	-----	-----	----	-----	45	135	Medium-----	Fair.
------	-----	-----	-----	---	- -	40	125	Medium-----	Fair.
------	.3	-----	-----	----	-----	35	120	Low--------	Poor.
------	-----	-----	-----	----	-----	30	75	Medium-----	Poor.
------	-----	-----	-----	----	-----	30	75	Medium-----	Fair.
-----	-----	- -	- -	---	----	-----	25	55	Low--------	Fair.
.5	1.0	-----	-----	----	-----	60	100	Medium-----	Fair.
.6	1.0	- -	- -	-	----	-----	70	110	Medium-----	Fair.
.8	1.5	2.5	3.5	115	190	75	155	Medium-----	Excellent.
.8	1.5	2.5	3.5	115	190	70	150	Medium-----	Excellent.
.8	1.5	2.4	3.4	110	185	65	150	Medium-----	Very good.
.8	1.4	2.1	3.1	110	185	60	140	Medium-----	Very good.
.7	1.4	2.0	3.0	100	180	55	135	Medium-----	Very good.
.7	1.1	1.9	2.8	80	170	60	130	Medium-----	Good.
.5	1.0	1.9	2.8	----	-----	50	130	Medium-----	Fair.
1.3	1.9	3.0	4.0	130	190	160	240	Very high----	Very good.
1.1	1.7	2.8	3.6	120	200	125	200	High--------	Excellent.

TABLE 6.—*Estimated average acre yields of principal crops to be management, and the productivity and*

[Yields in columns A to be expected under the ordinary management practiced in best practical management most farmers in the county could follow; blank specified]

Soils	Cotton (lint)		Corn		Wheat		Soybean hay	
	A	B	A	B	A	B	A	B
	Lbs.	*Lbs.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*
Jefferson fine sandy loam, undulating phase.	400	550	28	56	15	22	1. 9	2. 9
Jefferson fine sandy loam, eroded undulating phase.	400	540	26	56	14	20	1. 9	2. 9
Jefferson fine sandy loam, rolling phase.	360	540	25	50	12	20	1. 8	2. 7
Jefferson fine sandy loam, eroded rolling phase.	350	520	24	48	12	20	1. 7	2. 6
Johnsburg loam [7]	----	[6] 400	22	46	----	20	1. 8	2. 8
Lickdale silt loam [7]	----	----	----	50	----	20	----	2. 5
Limestone rockland, rolling [6]	----	----	----	----	----	----	----	----
Limestone rockland, rough	----	----	----	----	----	----	----	----
Lindside silty clay loam [7]	----	----	40	70	----	20	2. 5	3. 3
Linker fine sandy loam, undulating phase.	450	625	30	60	15	22	2. 0	3. 0
Linker fine sandy loam, eroded undulating phase.	430	625	28	60	15	22	2. 0	3. 0
Linker fine sandy loam, rolling phase.	380	560	25	50	12	20	1. 8	2. 7
Linker fine sandy loam, eroded rolling phase.	360	550	24	48	12	20	1. 7	2. 6
Linker fine sandy loam, eroded hilly phase.	180	360	11	30	----	16	1. 2	2. 2
Linker loam, severely eroded rolling phase.[6]	160	380	10	30	----	18	. 7	2. 0
Melvin silt loam [7]	----	----	----	50	----	----	----	2. 6
Monongahela fine sandy loam	250	480	25	50	12	20	1. 8	3. 0
Muskingum fine sandy loam, hilly phase.[6]	----	----	----	----	8	14	----	----
Muskingum fine sandy loam, eroded hilly phase.[6]	----	----	----	----	8	14	----	----
Muskingum stony fine sandy loam, rolling phase.	----	----	----	----	----	----	----	----
Muskingum stony fine sandy loam, hilly phase.[6]	----	----	----	----	----	----	----	----
Muskingum stony fine sandy loam, eroded hilly phase.[6]	----	----	----	----	----	----	----	----
Muskingum stony fine sandy loam, steep phase.[6]	----	----	----	----	----	----	----	----
Nolichucky fine sandy loam, undulating phase.	400	550	28	56	15	22	1. 9	2. 9
Nolichucky fine sandy loam, eroded undulating phase.	400	540	26	56	14	20	1. 9	2. 9
Nolichucky gravelly fine sandy loam, eroded undulating phase.	380	500	24	54	12	17	1. 7	2. 6
Nolichucky gravelly fine sandy loam, rolling phase.	320	450	20	46	10	17	1. 7	2. 6

See footnotes at end of table.

expected on the soils of Morgan County, Ala., under two levels of workability for each soil—Continued

the county at the time of survey; yields in columns B to be expected under the spaces indicate crop ordinarily is not grown on the soil at the level of management

Lespedeza hay		Alfalfa hay		Potatoes		Permanent pasture		Productivity [1]	Workability [2]
A	B	A	B	A	B	A	B		
Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Cow-acre-days* [3]	*Cow-acre-days* [3]		
0.8	1.5	2.5	3.5	115	190	70	150	Medium	Excellent.
.8	1.5	2.4	3.4	110	185	65	150	Medium	Very good.
.7	1.3	2.0	2.9	100	180	60	145	Medium	Very good.
.7	1.2	1.8	2.8	100	170	60	140	Medium	Good.
.7	1.6			70	[6] 180	70	140	Low	Fair.
.6	1.2					50	150	Low	Fair.
								Low	Poor.
								Very low	Very poor.
1.3	1.9					160	240	High	Good.
.8	1.5	2.5	3.5	125	200	65	150	High	Excellent.
.8	1.5	2.5	3.5	125	200	60	140	Medium	Very good.
.7	1.3	2.0	2.9	100	180	70	150	High	Very good.
.7	1.2	1.8	2.8	100	170	60	140	Medium	Good.
.4	1.0					50	100	Medium	Fair.
.4	1.0		2.7			40	100	Low	Fair.
.6	1.4					90	200	Low	Fair.
.8	1.6					55	135	Low	Fair.
.4	.8					40	130	Low	Fair.
.4	.8					35	120	Low	Poor.
						40	130	Low	Poor.
						25	70	Very low	Poor.
						25	70	Very low	Poor.
						20	50	Very low	Very poor.
.8	1.5	2.5	3.5	115	190	65	150	Medium	Excellent.
.8	1.5	2.4	3.4	110	185	60	140	Medium	Very good.
.7	1.4	2.0	3.0	100	180	50	130	Medium	Very good.
.7	1.1	1.9	2.8	80	170	50	120	Medium	Very good.

TABLE 6.—*Estimated average acre yields of principal crops to be management, and the productivity and*

[Yields in columns A to be expected under the ordinary management practiced in best practical management most farmers in the county could follow; blank specified]

Soils	Cotton (lint)		Corn		Wheat		Soybean hay	
	A	B	A	B	A	B	A	B
	Lbs.	*Lbs.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*
Nolichucky gravelly fine sandy loam, eroded rolling phase.	310	440	20	46	9	16	1. 6	2. 5
Nolichucky gravelly fine sandy loam, hilly phase.[6]	-----	-----	----	----	----	----	-----	-----
Ooltewah silt loam [7]	-----	460	40	70	----	20	2. 5	3. 3
Ooltewah fine sandy loam [7]	-----	480	30	60	----	20	2. 3	3. 1
Pearman loam, undulating phase	200	400	20	42	13	22	1. 3	2. 0
Pearman loam, eroded undulating phase.	180	360	15	36	10	19	1. 2	1. 9
Pearman loam, eroded rolling phase.	170	330	12	32	9	18	1. 0	1. 7
Pearman silty clay loam, severely eroded rolling phase.	140	300	----	----	8	12	. 4	1. 0
Philo fine sandy loam [7]	-----	-----	30	55	----	18	2. 0	3. 0
Philo-Lindside soils, undifferentiated.[7]	-----	-----	35	60	----	18	2. 2	3. 0
Pope fine sandy loam	-----	-----	32	60	13	20	2. 0	3. 0
Pottsville shaly silt loam, hilly phase.[6]	-----	-----	----	----	----	----	-----	-----
Pottsville shaly silt loam, eroded hilly phase.[6]	-----	-----	----	----	----	----	-----	-----
Pottsville shaly silt loam, severely eroded hilly phase.[6]	-----	-----	----	----	----	----	-----	-----
Pottsville shaly silt loam, steep phase.[6]	-----	-----	----	----	----	----	-----	-----
Robertsville silt loam [7]	-----	-----	----	50	----	20	-----	2. 8
Rough gullied land (Decatur and Cumberland soil materials).[6]	-----	-----	----	----	----	----	-----	-----
Rough gullied land (Linker and Hartsells soil materials).[6]	-----	-----	----	----	----	----	-----	-----
Sequatchie fine sandy loam	450	625	38	65	18	25	2. 0	3. 0
Sequatchie fine sandy loam, eroded phase.	430	625	35	60	17	24	2. 0	3. 0
Stony smooth land (Talbott and Colbert soil materials).[6]	-----	-----	----	----	----	----	----	--
Stony rolling land (Talbott and Colbert soil materials).[6]	-----	-----	----	----				
Stony rough land (Muskingum soil material).[6]	-----	--		----	----	----	-----	-----
Taft silt loam [7]	-----	440	24	50		20	1. 9	3. 0
Talbott loam, eroded undulating phase.	240	410	28	42	15	21	1. 8	2. 8
Talbott loam, eroded rolling phase	200	340	22	36	13	18	1. 5	2. 5
Talbott silt loam, undualting phase	250	430	30	46	16	24	1. 9	2. 9
Talbott silty clay loam, eroded undulating phase.	240	400	27	42	15	20	1. 8	2. 7

See footnotes at end of table.

expected on the soils of Morgan County, Ala., under two levels of workability for each soil—Continued

the county at the time of survey; yields in columns B to be expected under the spaces indicate crop ordinarily is not grown on the soil at the level of management

Lespedeza hay		Alfalfa hay		Potatoes		Permanent pasture		Productivity [1]	Workability [2]
A	B	A	B	A	B	A	B		
Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Cow-acre-days* [2]	*Cow-acre-days* [3]		
0.5	1.0	1.9	2.8			45	110	Low	Good.
						40	80	Low	Fair.
1.3	1.9					150	240	Very high	Good.
1.2	1.8			110	180	140	215	Medium	Very good.
.7	1.1	1.5	2.7			70	140	Medium	Fair.
.6	1.0	1.3	2.5			60	125	Low	Poor.
.5	1.0	1.2	2.4			55	120	Low	Poor.
.4	.8					40	100	Low	Poor.
.9	1.7					90	210	Low	Good.
1.1	1.8					125	190	Medium	Good.
1.0	1.6			110	190	130	220	High	Very good.
						35	120	Very low	Poor.
						30	110	Very low	Poor.
						20	80	Very low	Very poor.
							50	Very low	Very poor.
.6	1.2					60	180	Low	Fair.
	.4						130	Very low	Very poor.
							130	Very low	Very poor.
1.1	1.8	2.7	3.7	110	230	90	170	High	Excellent.
.9	1.6	2.6	3.6	100	210	90	170	Medium	Very good.
						45	90	Low	Poor.
						30	70	Low	Poor.
						0	0	Very low	Very poor.
.8	1.7					90	170	Low	Fair.
.7	1.3	2.0	2.8			80	155	Low	Fair.
.5	1.0	1.8	2.7			70	135	Medium	Fair.
.9	1.5	2.1	3.0			85	150	Medium	Good.
.7	1.3	2.0	2.7			70	145	Low	Fair.

TABLE 6.—*Estimated average acre yields of principal crops to be management, and the productivity and*

[Yields in columns A to be expected under the ordinary management practiced in best practical management most farmers in the county could follow; blank specified]

Soils	Cotton (lint)		Corn		Wheat		Soybean hay	
	A	B	A	B	A	B	A	B
	Lbs.	*Lbs.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*
Talbott silty clay loam, eroded rolling phase.	200	330	21	35	12	17	1. 5	2. 4
Talbott silty clay loam, severely eroded rolling phase.[6]	140	280		32	9	14	1. 0	2. 0
Talbott silty clay loam, eroded hilly phase.[6]					8	15	1. 0	2. 1
Talbott cherty silty clay loam, eroded rolling phase.	200	330	21	35	12	17	1. 5	2. 4
Talbott cherty silty clay loam, eroded hilly phase.[6]								
Tilsit silt loam, level phase	400	560	28	55	10	17	1. 9	2. 2
Tilsit silt loam, undulating phase	420	580	28	55	15	22	2. 0	3. 0
Tilsit silt loam, eroded undulating phase.	420	580	28	55	15	22	2. 0	3. 0
Tilsit silt loam, rolling phase	360	500	23	48	12	18	1. 7	2. 6
Tilsit silt loam, eroded rolling phase.	350	480	22	46	11	17	1. 7	2. 5
Tilsit clay loam, severely eroded rolling phase.	310	400	18	40	9	16	1. 1	1. 9
Tupelo silt loam [7]	200	400	15	35	9	18	2. 0	2. 8
Tupelo loam [7]	220	420	16	36	10	18	2. 0	2. 9
Tyler silt loam [7]		430		50		20	1. 8	3. 0
Tyler fine sandy loam [7]		440	24	50		20	1. 8	3. 0
Waynesboro fine sandy loam, undulating phase.	370	600	28	50	17	24	2. 0	3. 2
Waynesboro fine sandy loam, eroded undulating phase.	360	580	25	50	16	23	1. 9	3. 2
Waynesboro fine sandy loam, eroded rolling phase.	310	500	23	48	14	20	1. 7	2. 8
Waynesboro fine sandy loam, severely eroded rolling phase.	160	380	10	30		18	. 7	2. 0
Wolftever silt loam	250	430	30	46	16	24	1. 9	2. 9

[1] Capacity of the soil to produce crops under farm practice prevailing at the time of survey.

[2] Expresses relative ease of tillage, harvesting, and other field operations.

[3] Number of days 1 acre will graze a mature cow without injury to the pasture.

[4] Crop ordinarily not planted because high organic-matter content of soil produces rank growth, late maturity, or lodging; or because soil is better suited to other crops.

expected on the soils of Morgan County, Ala., under two levels of workability for each soil—Continued

the county at the time of survey; yields in columns B to be expected under the spaces indicate crop ordinarily is not grown on the soil at the level of management

Lespedeza hay		Alfalfa hay		Potatoes		Permanent pasture		Productivity [1]	Workability [2]
A	B	A	B	A	B	A	B		
Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Cow-acre-days* [3]	*Cow-acre-days* [3]		
0.5	1.0	1.7	2.6	----	-----	60	125	Low	Fair.
.3	.7	-----	-----	----	-----	30	100	Low	Fair.
.4	.9	-----	-----	----	-----	50	110	Low	Poor.
.5	1.0	1.7	2.6	----	-----	55	115	Low	Poor.
.4	.9	---	--	--	--- -	50	120	Low	Poor.
.7	1.0	-----	1.6	80	160	60	90	High	Very good.
.8	1.5	2.1	3.1	120	190	75	160	High	Very good.
.8	1.5	2.1	3.1	120	190	75	160	Medium	Very good.
.7	1.3	1.9	2.9	100	175	65	145	High	Very good.
.7	1.2	1.8	2.8	----	-----	65	140	Medium	Good.
.5	1.0	-----	-----	----	-----	45	110	Low	Poor.
.7	1.2	-----	-----	----	-----	70	130	Low	Fair.
.8	1.3	-----	-----	----	-----	70	130	Low	Fair.
.8	1.7	-----	-----	----	-----	90	170	Low	Fair.
.7	1.7	-- --	-----	----	--- ---	90	160	Low	Fair.
.9	1.4	2.2	3.2	110	190	90	180	High	Excellent.
.8	1.4	2.1	3.2	100	180	80	160	Medium	Very good.
.5	1.3	2.0	3.1	75	110	70	150	Medium	Good.
.4	1.0	-----	2.7	----	100	40	110	Low	Fair.
.9	1.5	2.1	3.0	----	-----	85	150	Medium	Good.

[5] Crop ordinarily not planted on soil because of freezing, flooding, or lodging.
[6] Yields in better areas—those with milder slopes, less damage from erosion, and so on.
[7] Management for yields in columns B includes adequate drainage.

CAPABILITY GROUPS OF SOILS

The capability grouping of soils is an arrangement according to relative suitability for crops, grazing, forestry, wildlife, or other uses, and the risks of erosion or other damage. The estimate of this suitability is a consensus of several persons who know the soils and work with them. Soils that are nearly level, well drained, free from overflow, fairly fertile, and not otherwise limited are placed in capability class I. They are widely adaptable and the user of them has many choices open to him. He can use his class I soils for crops, without special practices, and can choose one of several cropping systems; or he may, if he wishes, use the soil for pasture or for some other purpose.

Soils are placed in class II if they are a little less widely adaptable and thus more limited than those in class I. A gently sloping soil, for example, must be farmed on the contour or managed in some other way to control runoff and erosion. Other kinds of class II land are limited and require special management because of excess water on or in the soil, because of sandy or shallow soils that have low moisture-holding capacity, or because of the climate.

Soils are placed in capability class III if they are less adaptable or have more stringent management requirements than those in class II, and yet can be used on a long-time basis for a satisfactory cropping system. Soils even less adaptable and therefore more limited than those in class III, but usable for tillage part of the time or with special precautions, are in class IV.

Soils not suitable for cultivation are in classes V, VI, VII, or VIII. Class V (none in Morgan County) contains the soils not subject to erosion but totally unsuitable for usual cultivation because of standing water or some other limitation. Class VI contains the soils, many of them steep, that yield fairly good amounts of forage or of forest products, but should not as a rule be cultivated. Some of them can with safety be disturbed just enough to prepare them for orchards, tree crops, or extremely long-time pastures. Soils in class VII are more limited than those in Class VI, are not suitable for any cultivation, and usually give only fair or poor yields of forage or wood products. Soils in class VIII are so severely limited that they produce little useful vegetation. They may make attractive scenery, or may be parts of useful watersheds. Some have a little value for production of wildlife.

SUBCLASSES: Most of the capability classes include different kinds of soils. It is convenient to recognize capability subclasses, which are groups of soils within the broad capability classes that are affected by about the same kind of dominant limiting factor. As many as four subclasses are recognized, if they occur, according to dominant limitation. These are risk of erosion (e), excess water (w), shallow or droughty soil (s), and hazardous climate (c). Subclasses are denoted by a small letter following the class number, such as IIe or IIw.

Capability classes and subclasses in Morgan County are given in the following list. The brief description of each subclass gives the general nature of the soils but is not a complete description.

CLASS I.—Soils safe for use under intensive cultivation, without special practices to control runoff or erosion, and which may be

expected to produce high yields with good soil and crop management.

CLASS II.—Soils that can be used for tilled crops but under slight risks of erosion or other slight limitations.

IIe: Undulating or gently sloping soils, well to fairly well drained.

IIw: Soils on flood plains; slow internal drainage or subject to overflow.

CLASS III.—Soils that can be used for tilled crops, but under moderate risks of erosion or other severe limitations.

IIIe: Rolling or eroded undulating soils.

IIIw: Imperfectly drained or wet soils, difficult to drain.

IIIs: Sandy soils.

CLASS IV.—Soils that have severe limitations or high risks of soil damage when used for cultivation, and when so used require special management.

IVe: Eroded or severly eroded rolling soils.

IVw: Poorly drained soils not well suited to crops.

CLASS VI.—Soils too steep, too sandy, or too wet for cultivation; suitable for pasture.

VIe: Chiefly hilly or stony soils.

CLASS VII.—In this county, moderately sloping loamy sand too droughty and erodible for cultivation and of low suitability for pasture.

VIIe: Steep, shallow soil or rough land.

The capability class and subclass for the soils mapped are shown in the following list:

Soil name:	*Class and subclass*
Abernathy fine sandy loam	I.
Abernathy silt loam	I.
Allen fine sandy loam, eroded hilly phase	IVe.
Allen fine sandy loam, eroded rolling phase	IIIe.
Allen fine sandy loam, eroded undulating phase	IIe.
Allen fine sandy loam, hilly phase	IVe.
Allen fine sandy loam, rolling phase	IIIe.
Allen fine sandy loam, severely eroded hilly phase	VIe.
Allen fine sandy loam, severely eroded rolling phase	IVe.
Allen fine sandy loam, undulating phase	IIe.
Allen stony fine sandy loam, eroded rolling phase	VIe.
Allen stony fine sandy loam, hilly phase	VIe.
Atkins silt loam	IIIw.
Barbourville fine sandy loam	I.
Bruno loamy fine sand	IIIs.
Captina and Capshaw loams, undifferentiated	IIe.
Captina and Capshaw silt loams, undifferentiated	IIe.
Christian clay loam, severely eroded rolling phase	IIIe.
Christian loam, eroded rolling phase	IIIe.
Christian loam, eroded undulating phase	IIe.
Christian loam, undulating phase	IIe.
Cobbly colluvium (Jefferson soil material)	VIe.
Colbert cherty silt loam, rolling phase	IVe.
Colbert loam, eroded rolling phase	IVe.
Colbert loam, eroded undulating phase	IIIe.
Colbert loam, hilly phase	VIe.
Colbert loam, rolling phase	IVe.
Colbert loam, undulating phase	IIIe.
Colbert silt loam, level phase	IVw.
Colbert silt loam, undulating phase	IIIe.
Colbert silty clay loam, eroded rolling phase	VIe.

Soil name—Continued	*Class and subclass*
Colbert silty clay loam, eroded undulating phase	IVe.
Cotaco loam	IIw.
Crossville loam, undulating phase	IIIe.
Cumberland silt loam, level phase	I.
Cumberland silt loam, undulating phase	IIe.
Cumberland silty clay loam, eroded undulating phase	IIIe.
Cumberland silty clay loam, severely eroded rolling phase	IIIe.
Decatur silt loam, undulating phase	IIe.
Decatur silty clay loam, eroded undulating phase	IIIe.
Decatur silty clay loam, severely eroded rolling phase	IVe.
Dewey cherty silt loam, undulating phase	IIe.
Dewey cherty silty clay loam, eroded rolling phase	IVe.
Dewey cherty silty clay loam, eroded undulating phase	IIIe.
Dewey silt loam, undulating phase	IIe.
Dewey silty clay loam, eroded hilly phase	VIe.
Dewey silty clay loam, eroded rolling phase	IIIe.
Dewey silty clay loam, eroded undulating phase	IIIe.
Dunning silty clay	IIIw.
Egam silty clay loam	IIw.
Enders loam, eroded rolling phase	IIIe.
Enders loam, eroded undulating phase	IIe.
Enders loam, rolling phase	IIIe.
Enders loam, undulating phase	IIe.
Etowah loam, level phase	I.
Etowah loam, undulating phase	IIe.
Etowah silty clay loam, eroded undulating phase	IIIe.
Guthrie silt loam	IVw.
Hanceville fine sandy loam, eroded rolling phase	IIIe.
Hanceville fine sandy loam, eroded undulating phase	IIe.
Hanceville fine sandy loam, undulating phase	IIe.
Hanceville loam, severely eroded rolling phase	IVe.
Hartsells fine sandy loam, eroded rolling phase	IIIe.
Hartsells fine sandy loam, eroded rolling shallow phase	IVe.
Hartsells fine sandy loam, eroded undulating phase	IIe.
Hartsells fine sandy loam, rolling phase	IIIe.
Hartsells fine sandy loam, rolling shallow phase	IVe.
Hartsells fine sandy loam, undulating phase	IIe.
Hartsells fine sandy loam, undulating shallow phase	IIIe.
Hartsells loam, undulating phase	IIe.
Hector fine sandy loam, eroded hilly phase	VIe.
Hector fine sandy loam, hilly phase	VIe.
Hector fine sandy loam, severely eroded hilly phase	VIIe.
Hector stony fine sandy loam, eroded hilly phase	VIe.
Hector stony fine sandy loam, hilly phase	VIe.
Hector stony fine sandy loam, steep phase	VIIe.
Hollywood loam	IIIw.
Hollywood silty clay	IIIw.
Holston fine sandy loam, eroded undulating phase	IIe.
Holston fine sandy loam, level phase	I.
Holston fine sandy loam, undulating phase	IIe.
Holston gravelly fine sandy loam, eroded rolling phase	IIIe.
Holston gravelly fine sandy loam, eroded undulating phase	IIe.
Holston gravelly fine sandy loam, rolling phase	IIIe.
Holston gravelly fine sandy loam, undulating phase	IIe.
Huntington fine sandy loam, sanded phase	IIw.
Huntington silt loam	IIw.
Jefferson fine sandy loam, eroded rolling phase	IIIe.
Jefferson fine sandy loam, eroded undulating phase	IIe.
Jefferson fine sandy loam, rolling phase	IIIe.
Jefferson fine sandy loam, undulating phase	IIe.
Johnsburg loam	IIIw.
Lickdale silt loam	IIIw.
Limestone rockland, rolling	VIIe.
Limestone rockland, rough	VIIe.
Lindside silty clay loam	IIw.
Linker fine sandy loam, eroded hilly phase	IVe.

Soil name—Continued	*Class and subclass*
Linker fine sandy loam, eroded rolling phase	IIIe.
Linker fine sandy loam, eroded undulating phase	IIe.
Linker fine sandy loam, rolling phase	IIIe.
Linker fine sandy loam, undulating phase	IIe.
Linker loam, severely eroded rolling phase	IVe.
Melvin silt loam	IIIw.
Monongahela fine sandy loam	IIe.
Muskingum fine sandy loam, eroded hilly phase	VIe.
Muskingum fine sandy loam, hilly phase	VIe.
Muskingum stony fine sandy loam, eroded hilly phase	VIe.
Muskingum stony fine sandy loam, hilly phase	VIe.
Muskingum stony fine sandy loam, rolling phase	VIe.
Muskingum stony fine sandy loam, steep phase	VIIe.
Nolichucky fine sandy loam, eroded undulating phase	IIe.
Nolichucky fine sandy loam, undulating phase	IIe.
Nolichucky gravelly fine sandy loam, eroded rolling phase	IIIe.
Nolichucky gravelly fine sandy loam, eroded undulating phase	IIe.
Nolichucky gravelly fine sandy loam, hilly phase	IVe.
Nolichucky gravelly fine sandy loam, rolling phase	IIIe.
Ooltewah fine sandy loam	IIw.
Ooltewah silt loam	IIw.
Pearman loam, eroded rolling phase	IVe.
Pearman loam, eroded undulating phase	IIIe.
Pearman loam, undulating phase	IIIe.
Pearman silty clay loam, severely eroded rolling phase	VIe.
Philo fine sandy loam	IIw.
Philo-Lindside soils, undifferentiated	IIw.
Pope fine sandy loam	IIw.
Pottsville shaly silt loam, eroded hilly phase	VIe.
Pottsville shaly silt loam, hilly phase	VIe.
Pottsville shaly silt loam, severely eroded hilly phase	VIIe.
Pottsville shaly silt loam, steep phase	VIIe.
Robertsville silt loam	IVw.
Rough gullied land (Decatur and Cumberland soil materials)	VIIe.
Rough gullied land (Linker and Hartsells soil materials)	VIIe.
Sequatchie fine sandy loam	I.
Sequatchie fine sandy loam, eroded phase	IIe.
Stony rolling land (Talbott and Colbert soil materials)	VIe.
Stony rough land (Muskingum soil material)	VIIe.
Stony smooth land (Talbott and Colbert soil materials)	VIe.
Taft silt loam	IIIw.
Talbott cherty silty clay loam, eroded hilly phase	VIe.
Talbott cherty silty clay loam, eroded rolling phase	IVe.
Talbott loam, eroded rolling phase	IVe.
Talbott loam, eroded undulating phase	IIIe.
Talbott silt loam, undulating phase	IIIe.
Talbott silty clay loam, eroded hilly phase	VIe.
Talbott silty clay loam, eroded rolling phase	IVe.
Talbott silty clay loam, eroded undulating phase	IIIe.
Talbott silty clay loam, severely eroded rolling phase	VIe.
Tilsit clay loam, severely eroded rolling phase	IVe.
Tilsit silt loam, eroded rolling phase	IIIe.
Tilsit silt loam, eroded undulating phase	IIe.
Tilsit silt loam, level phase	IIe.
Tilsit silt loam, rolling phase	IIIe.
Tilsit silt loam, undulating phase	IIe.
Tupelo loam	IIIe.
Tupelo silt loam	IIIe.
Tyler fine sandy loam	IIIw.
Tyler silt loam	IIIw.
Waynesboro fine sandy loam, eroded rolling phase	IIIe.
Waynesboro fine sandy loam, eroded undulating phase	IIe.
Waynesboro fine sandy loam, severely eroded rolling phase	IVe.
Waynesboro fine sandy loam, undulating phase	IIe.
Wolftever silt loam	IIe.

SOIL ASSOCIATIONS

Soils occur in geographic patterns. A group of soils that occurs in a characteristically uniform geographic pattern is called a soil association. The soils in any one association may be similar or different. Information on soil associations is of value in studying the soils of a county or other area, in planning their potential use, and in understanding their relative agricultural importance.

The location and extent of the 10 soil associations of Morgan County are shown in figure 3. Associations 1, 2, 3, 6, and 10 consist chiefly of soils of the upland that overlie sandstone or interbedded sandstone and shale. Some of the soils in association 6 are on old alluvium or very high stream terraces. Soils of associations 4 and 5 consist largely of old alluvium. Some areas of this alluvium are on limestone and other parts are on sandstone. All of the soils of these two associations except Christian have been water-laid. Associations 8 and 9 consist of soils that have developed over limestone, or to a very great extent from limestone material. Association 7 is on areas of young alluvium on first bottoms and very low stream terraces.

Each of the 10 soil associations is named for the dominant soils it contains. Smaller acreages of other soils occur in each association.

HARTSELLS-ENDERS-MUSKINGUM ASSOCIATION

The Hartsells-Enders-Muskingum soil association is on the smooth, broad ridgetops and gentle slopes of Sand Mountain in the vicinity of Union Hill and Morgan City in the eastern part of the county, and near Eva and Hulaco in the southern part. Hartsells and Enders soils constitute a large part of this association, and nearly all crops common to the county are grown on them. The aggregate area of the association approximates 12 percent of the county, and about 85 percent of it has been cleared.

The Hartsells soils have a gray surface soil and yellow friable subsoil that overlies sandstone at depths of 30 to 60 inches. The Enders soils have a light brownish-gray mellow surface soil overlying a light-brown to reddish-brown slightly compact subsoil. The subsoil material is underlain at depths of 28 to 65 inches by thin lenses of sandstone and acid shale. The Muskingum soils are on the steep slopes, and, in general, they are stony and have some rock ledges.

Other less extensive soils in this association are the Hanceville, Hector, Linker, Crossville, Barbourville, Cotaco, and Atkins. The first four are underlain by a mixture of sandstone and shale at 18 to 60 inches. The Barbourville and Cotaco soils consist of materials washed from adjacent upland areas. The Atkins soil is a poorly drained alluvial soil along the streams.

The Hartsells and Enders soils, although low in fertility, are well suited to general farm crops, including cotton, sorghum, truck crops, and fruits. They are very responsive to good management and fairly easy to conserve and till. Soil management is at a relatively high level, and the communities in this soil association are generally prosperous. The Sand Mountain substation at Crossville in De Kalb County is on Hartsells soils, and the practices applicable at that station may be applied to crops grown on similar soils in Morgan County.

Muskingum soils are suitable mainly for forest, although the less steep slopes may furnish fair grazing. The less extensive soils in basins and on the bottom lands are suited to pasture, corn, hay, or sorghum.

STONY ROUGH LAND-POTTSVILLE-HARTSELLS ASSOCIATION

The Stony rough land-Pottsville-Hartsells association covers the major part of the rugged mountain slopes and occupies about 17 percent of the county. Much of it is too stony or steep for crops or pasture. The soils are low in fertility and shallow to bedrock. They provide timber, firewood, and some grazing.

Approximately 95 percent of the area is forested. Cedar, hickory, and oak predominate on the limestone rockland and stony land types. Mixed pines and hardwoods make up much of the cover on the other soils.

HANCEVILLE-HECTOR-LINKER-BARBOURVILLE ASSOCIATION

The Hanceville-Hector-Linker-Barbourville association constitutes the "red sandy land" around Laceys Spring, Talucah, and Flint. The aggregate area, approximately 4 percent of the county, occurs in several localities in a general east-west belt in the northern half. The surface is undulating to rolling, with some hilly areas. All of these soils have developed predominantly from sandstone, although bedrock shale is intermixed at places at depths of 1 to 5 feet.

The Hanceville and Linker soils occupy a considerable part of this association. They are low in natural fertility, have an undulating to rolling surface, and are 2½ to 5 feet deep to bedrock. They are not particularly difficult to work, but their position on relatively narrow, winding ridgetops interferes with terracing and other field operations. Although these soils are permeable, much of their acreage has runoff that requires erosion control measures.

Soils on moderately steep slopes probably occupy about 10 percent of the association. They are mainly Hector soils, which are shallow to bedrock and not well suited to tilled crops.

Practically all of this association was formerly in crops. About 60 percent is now under cultivation. The remaining cleared areas are now idle or have developed a cover of underbrush, sedgegrass, and sassafras, or a forest of old-field pine, sweetgum, and other trees. Much of the cropped acreage is severely eroded. Gullies are common in places.

ALLEN-HOLLYWOOD-CHRISTIAN-ATKINS ASSOCIATION

The Allen-Hollywood-Christian-Atkins soil association occupies broad, nearly level to rolling valleys below and adjacent to areas of the Stony rough land-Pottsville-Hartsells association. The aggregate area is approximately 26 percent of the county. Less extensive soils, such as Jefferson, Talbott, and Tupelo, are included.

Many of the soils consist of or are strongly influenced by limestone residuum. Some soils, such as the Allen and Jefferson, are at least moderately deep to bedrock, whereas the Hollywood, Talbott, and Tupelo soils are shallow to limestone bedrock. Moderate to good drainage prevails, but a large acreage of poorly to very poorly drained

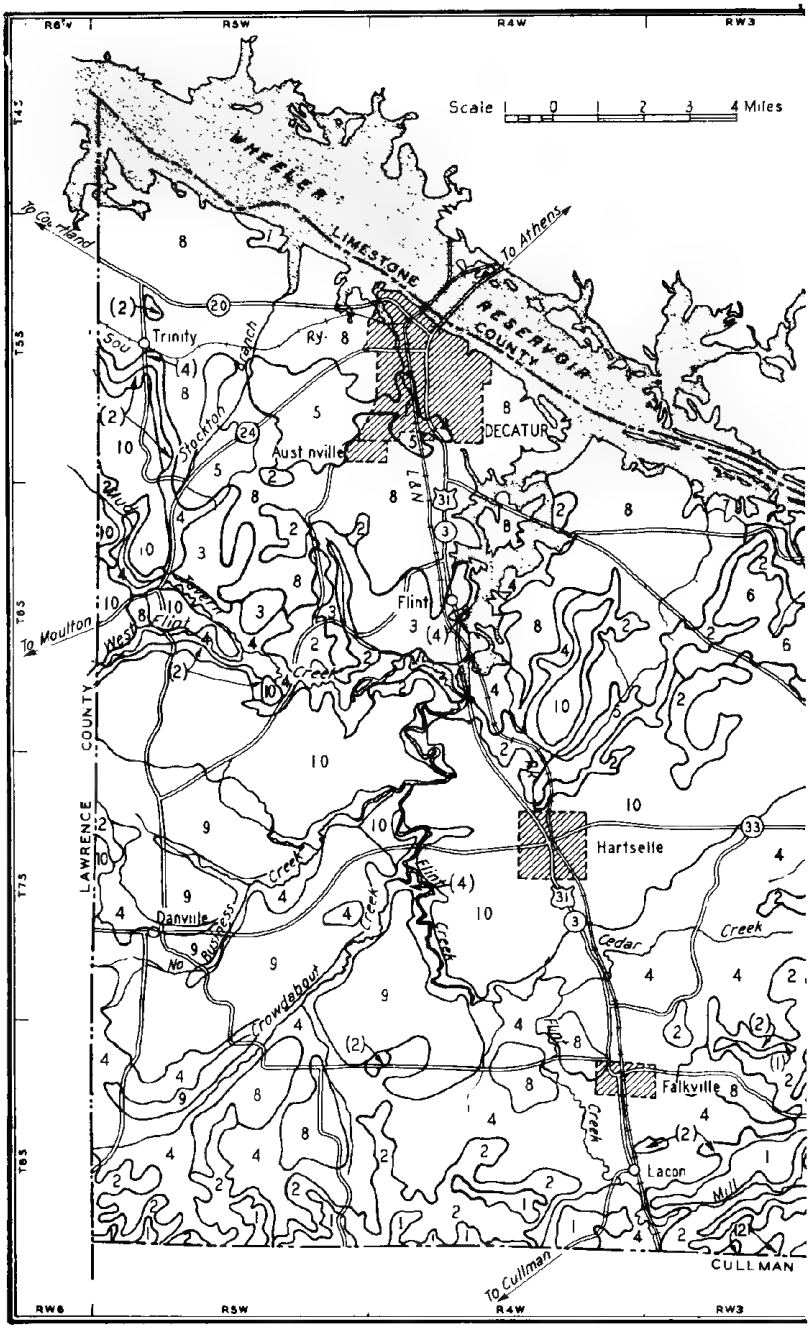
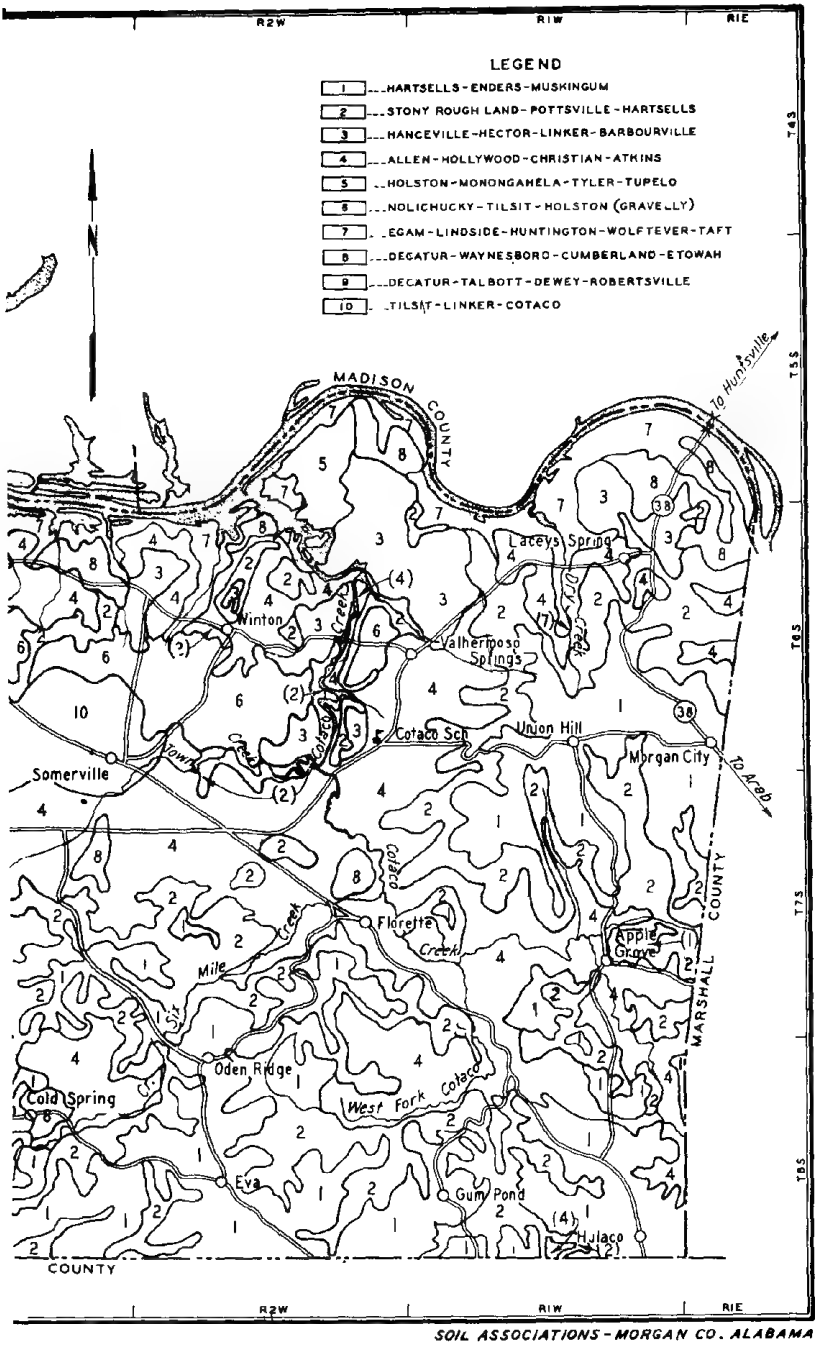


FIGURE 3.—Soil associations



SOIL ASSOCIATIONS - MORGAN CO. ALABAMA

of Morgan County, Ala.

soils has developed along some of the drains and streams. Consistence ranges from decidedly firm and plastic for the Hollywood, Talbott, and related soils to friable for the Allen, Christian, and Jefferson. Fertility is generally moderate to high; much of the acreage contains some lime.

This association is largely cleared and used for crops and pasture. Most of the crops common to the county are grown on the Allen and Christian soils. The heavier soils, especially those of the Hollywood series, are restricted to corn and legume-and-grass hay or pasture. They are productive of these crops.

Although a great part of this association is suited to crops, careful management is required because the slow permeability of the heavy soils causes runoff to develop rapidly during rainy periods.

HOLSTON-MONONGAHELA-TYLER-TUPELO ASSOCIATION

The Holston-Monongahela-Tyler-Tupelo soil association occupies nearly level to undulating areas on old stream terraces or benches. The aggregate area is small—approximately 2 percent of the county. The greater part lies southwest of Decatur; a small area is in the bend of the Tennessee River northeast of Winton. Areas of Holston soils predominate southwest of Decatur, but significant areas of Monongahela, Tyler, Tupelo, and Nolichucky soils are intermixed. The poorly drained Tyler and Atkins soils are widely distributed along the drainways. The area northeast of Winton consist predominantly of Capshaw and Robertsville soils, with some Etowah and Cumberland soils intermixed.

Practically all of the acreage of the better drained soils is cleared. These are favorable for diversified farming and are well suited to most of the crops commonly grown. The poorly drained soils are largely in forest or pasture, as much of their acreage is not well suited to crops. Fertility of most of the soils is at least medium. A part of the acreage, especially in the area northeast of Winton, is moderately high in fertility. This association is desirable for farming because the better drained soils are easy to work and conserve and respond well to good management.

NOLICHUCKY-TILSIT-HOLSTON (GRAVELLY) ASSOCIATION

Soils of the Nolichucky-Tilsit-Holston (gravelly) association are on irregular broken areas of old stream alluvium that has been deposited on sandstone. Some of the soils, chiefly the Nolichucky and Holston, consist of this old alluvial material, and others, chiefly the Tilsit and Muskingum, consist of sandstone residuum. Nolichucky, Tilsit, and Holston soils predominate on much of this undulating to rolling soil association.

The upland area this association occupies is dissected to a moderate extent by narrow valleys. Some of these slopes have a gradient of 10 to 25 percent. The sandstone is at a shallow depth in these more sloping areas and the Muskingum soils predominate. The aggregate area, about 2 percent of the county, lies in an irregular east-west belt between Winton and Somerville.

Much of this association is cultivated. As a whole, it contains some of the better agricultural land in the county. Although not high in fertility, those soils suited to crops respond well to good management and are easy to work and conserve. Areas on the steeper slopes require particular attention to the control of runoff. Some of the acreage contains gravel that interferes with cultivation. Most of the soils not suitable for cultivation can be made productive of pasture.

EGAM-LINDSIDE-HUNTINGTON-WOLFTEVER-TAFT ASSOCIATION

The Egam-Lindside-Huntington-Wolftever-Taft association occupies the nearly level to gently undulating first bottoms and low stream terraces along the Tennessee River. The aggregate area is about 3 percent of the county. Internal drainage ranges from excessive for the narrow strip of sandy soils along the river channel to very poor for the Melvin soils. Internal drainage for much of the association, however, is good. Much of the area would be subject to overflow if it were not now protected by dams on tributaries of the Tennessee River.

A large part of this association is used for crops. The soils, on the whole, are moderate to high in fertility. Where drainage is adequate or the soils are not too sandy, good to excellent yields are obtained. Corn and hay are among the better suited crops for the soils on first bottoms, whereas the soils on the low stream terraces are suited to a wider variety of crops, including cotton. Much of the limited acreage of poorly drained soils is capable of producing good pasture. Runoff control is a minor problem.

DECATUR-WAYNESBORO-CUMBERLAND-ETOWAH ASSOCIATION

The Decatur-Waynesboro-Cumberland-Etowah soil association occupies much of the "redlands" section of the county. Most of it is in one large area in the northwestern part. The aggregate area is about 13 percent of the county.

The association occupies a broad smooth lowland or valley position and consists chiefly of reddish, fertile, well-drained soils. The Decatur, Dewey, Waynesboro, Cumberland, Etowah, and Abernathy soils predominate. Yellow soils, chiefly of the Holston series, are an important part of the association in some places. On the whole, this is one of the stronger, or more naturally fertile, sections of the county.

A very great part of this association is cleared and cultivated. Much of it is suited to a wide variety of crops, including alfalfa and cotton. The general productivity is high, and good response can be expected from proper fertilization. The smoothest areas are easily worked and conserved, although tillage is more difficult than on such soils as the Hartsells and Sequatchie. Erosion should be restrained on the more sloping and eroded areas. Extensive tracts are well suited to the use of large farm machinery. Cropping and fertilizer practices found favorable at the Tennessee Valley substation at Belle Mina can be considered suitable for farms in this soil association.

DECATUR-TALBOTT-DEWEY-ROBERTSVILLE ASSOCIATION

The Decatur-Talbott-Dewey-Robertsville association occupies a smooth lowland or broad valley position near Danville. It consists

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of moderately fertile to fertile soils that overlie limestone. The aggregate area is about 6 percent of the county.

A very great part of this association has been cleared and is used for crops or pasture. It differs from the Decatur-Waynesboro-Cumberland-Etowah association in having a greater proportion of soils with a rather heavy or compact subsoil, in having a somewhat greater proportion of soils with slow internal drainage, and in having soils with shallower depth to bedrock.

Much of the acreage in this association is suited to a wide variety of crops. The soils having a more compact subsoil, however, have somewhat restricted suitability for agriculture. The poorly drained soils are mainly suitable for pasture and some hay crops. Alfalfa is suited to most of those areas where the soils have good internal drainage. Many other hay and pasture plants produce well on much of the acreage if good management is practiced.

This association, as a whole, is well suited to general livestock farming. Cropping and fertilizer practices used on the soils at the Tennessee Valley substation at Bella Mina, will be suitable for most farms in this association.

TILSIT-LINKER-COTACO ASSOCIATION

The Tilsit-Linker-Cotaco association lies in an irregular belt extending westward from the vicinity of Somerville and Hartselle to the Lawrence County Line. The aggregate area is approximately 11 percent oft he county.

The surface is predominantly undulating to rolling. A few narrow strips along some of the streams are hilly. The soils have developed from interbedded sandstone and shale. A large acreage is characterized by a pan layer at a depth ranging from 18 to 26 inches. In most places the soils are sufficiently deep to bedrock to be suitable for crops. They are not so deep as many of the soils in the Hartsells-Enders-Muskingum association.

A great part of the area is cleared and used for crops or pasture. The soils, in general, are suited to a wide variety of crops, including truck crops. The general level of fertility is lower than for many of the soils, such as those in associations 7, 8, and 9. Nevertheless, they respond well to proper fertilization. The pan layer interferes with the free movement of soil moisture, and as a result the soils are slower to warm up in the spring. As a consequence, the planting of crops is later than on many other soils, especially those of the Hartsells-Enders-Muskingum association.

High yields for many crops have been obtained where good management has been practiced. In general, cropping and fertilizer practices found favorable for soils at the Sand Mountain substation at Crossville can be expected to be suitable for farms in this association. The generally smooth surface of a great part of this area favors intensive farming and the use of large machinery.

FORESTS

Early settlers in this part of the Tennessee Valley found dense forests almost everywhere. There were only a few small openings, which were in the limestone valleys. These openings were generally

near streams and large springs and probably were cleared and kept open by Indians for village sites, recreational grounds, and for growing corn and other crops. The more common trees in the forests were post, white, red, black, blackjack, and chestnut oaks, hickory, poplar, walnut, chestnut, pine, gums, cedar, cherry, dogwood, maple, beech sourwood, ironwood, sycamore, and other minor species. Oak, hickory, pine, chestnut, and poplar were the prevailing timber trees. The stony Talbott and Colbert soils along the lower slopes of Sand and Little Mountains were noted for their virgin stand of redcedar.

It is evident that fairly solid stands of pine were on some of the well-drained soils in the valleys and that scattered stands were commonly intermixed with the deciduous hardwoods on the sandstone plateaus. Mixed forests consisting of large poplar, oak, and chestnut were on the steep stony slopes of the Muskingum soils and Stony rough land (Muskingum soil material). Along the stream bottoms the forest consisted of oak, hickory, beech, elm, poplar, gum, ash, maple, sycamore, pine, and a dense underbrush that included vines, briers, and saplings. Travel in the valley forest was difficult, even on horseback or on foot, because of the dense undergrowth. On the sandstone plateaus it was comparatively easy to travel by cart, wagon, horseback, or on foot.

FOREST RESOURCES

In the early days, in order to clear the land for crops, much of the timber, even choice logs, in excess of that needed for fuel or construction was rolled into piles and burned. No markets were available, and even the choice timber or timber products could not be disposed of at a profit. For many years thereafter sawmills were operated in all parts of the county, and as a result only a few scattered original hardwood stands remain on some of the rougher mountain slopes. The present timber stands are of second-growth material, and much of that has been cut in recent years.

The black walnut and redcedar have been cut, and the chestnut has been killed by blight (*3*).

Forest types.—The most extensive forest growth in the county is known as the yellow pine-hardwoods type (*5*). It constitutes 46 percent of the forest in the county. Trees of this type grow on nearly all of the well-drained soils of both the plateau and valley sections.

The upland hardwoods consist mostly of hickories and oaks. On the bottom lands more gum, maple, beech, and sycamore are found, along with some species of oak and hickory. A large percentage of the hardwood forest is in the vicinities of Danville, Falkville, and Decatur.

Cedar-hardwood forest constitutes about 7 percent of the county. Most of this kind of forest is near the base of the mountains on rolling and rough limestone rockland. The remaining forest consists chiefly of shortleaf and loblolly pines. This kind of forest is scattered throughout the county.

FOREST MANAGEMENT

A well-balanced forestry program should include research on utilization, fire control, reforestation, woodland grazing, and manage-

ment. Much research along these lines is being carried on by the Alabama Agricultural Experiment Station, independently, or in cooperation with other public agencies.

FIRE CONTROL

Uncontrolled forest fires are regarded as the most serious enemy of a forest. They destroy young trees and retard the growth of older ones; they weaken stands, encourage attack from insects and diseases, lower the water-holding capacity of the soil, cause erosion, and reduce soil fertility. It is almost impossible to reproduce a satisfactory stand of desirable forest trees unless fire is excluded (pl. 4, *B*).

Practically all fires are caused by man and, therefore, are largely preventable through proper understanding and precautions. The main causes are intentional burning, careless smoking, debris burning, accidental burning along railroads and around lumbering sites, and lightning. Special attention should be given to fire control during droughts, when the entire forest cover may be very dry. Burning usually causes more damage during these dry periods than at any other time.

There is no organized forest fire protection except for that on the Tennessee Valley Authority's Wheeler Reservation. However, in recent years a majority of the farmers have come to realize the value of fire control, and many of them now exert much effort to prevent fires on their farm woodlands.

CUTTING METHODS

Use of good cutting methods is almost as important as fire control. A careful method of selecting the trees to be cut should be followed. A good stand of healthy vigorous well-spaced trees should be left for later cutting. This kind of cutting requires cooperation between the landowner and the forest industries. Unless the owner is cutting his own trees, the trees to be cut should be marked or otherwise designated for cutting. Little or no selective cutting is now practiced.

In young second-growth pine and hardwood stands it is good practice to make improvement thinnings to remove the low grade, diseased, or undesirable trees to make space for those of good quality. Trees cut should be used, so far as possible, for the product that will bring best returns. All cutting practices should be aimed at increasing the amount and quality of the growing stock which, in time, will bring heavier yields and higher returns. Increasing the growing stock will require years of carefully planned cutting but will eventually bring far better yields of timber.

GRAZING AND PEST CONTROL

Cattle, hogs, and sheep have been grazed on forest land for generations. This practice has caused considerable damage to young timber. In many instances it is responsible for forest fires, as many stockmen believe annual burning is necessary to improve grazing. At present a large part of the forest, except on the steep stony slopes, is grazed, especially during the spring and early in summer.

Livestock specialists generally do not approve of woodland grazing. They feel a fully stocked woodland offers very little forage. In some areas it may be profitable to use the land for both cattle and forest during the early stages of forest development, but livestock should not be allowed to graze where they will destroy the young trees needed for regeneration. Grazing in hardwood forest is considered more harmful than in the pine forest, as cattle prefer the young hardwood sprouts. Grazing in itself, however, does tend to reduce the fire hazard by keeping down the grass, especially in dry seasons.

Control of insects and diseases is an important part of practical forest management. Climatic conditions are often responsible for the outbreak of insect infestation and spread of disease or blights. Forest fires also encourage attack from these enemies. Removing the diseased and infested trees offers some control.

PLANTING

It is important that condition of the site rather than personal preference determine the kind of trees selected for reforestation. According to the Handbook of Alabama Agriculture (*2*), loblolly pine and redcedar are conifers well suited as planting stock; and black locust, white oak, post oak, red oak, yellow-poplar, ash, and hickory are among the most suitable deciduous trees.

Black locust does well where moist, well-aerated soil material has accumulated behind check dams. Where the land has been intensively prepared and fertilized with phosphorus, some good stands have been obtained on favorable exposures on the Decatur, Dewey, Cumberland, and Christian soils. Good results have been obtained by planting black locust interspersed with pine on eroded phases of the Colbert, Talbott, and Pearman soils.

Yellow-poplar and black walnut are valuable for hardwood plantings, but they are exacting in their requirements for moisture and soil fertility.

Shortleaf and loblolly pine are probably among the most suitable trees for planting under most conditions (pl. 2, *C*). They are less exacting than the hardwoods in their site requirements, are well suited to the sandy soils, grow reasonably well on eroded areas that have a fairly friable subsoil, and grow to timber size rapidly. Some good results have been obtained by planting pine over the main part of the eroded areas and black locust in the gullies where check dams have been constructed. Pines have grown well on severely eroded and hilly to steep soils that are shallow to shale and sandstone. Although not particularly desirable, the Virginia pine has proven more hardy on the severely eroded spots than most species.

Redcedar is well suited to the limestone glady land areas (Stony land, Talbott and Colbert soil materials). Although this species is not so easily established by planting as are the commonly planted pines, sufficient volunteer seed trees come up to maintain an adequate stand.

REFORESTATION

Although approximately 1,500 acres of land have been planted to forests, a large acreage of idle, nonproductive land in Morgan County

is in need of reforestation. Tree planting, however, should be limited to land that is to remain in permanent forest or that needs a long period of rejuvenation before being cropped or pastured again. The Alabama Agricultural Experiment Station at Auburn found that returns per acre from 12- to 17-year-old pine plantations were comparable to returns from improved pastures.

The rate of growth on forest plantations or in areas naturally reforested depends largely upon the number of trees per acre. For example, at the experiment station, trees spaced 6 x 6 feet (the most practical spacing) yield 26.6 cords per acre at 12 years of age, whereas trees spaced 20 x 20 feet produced only 2.8 cords per acre at 12 years.

Advice on reforestation practices may be obtained from the local county agricultural agent, the experiment station, or the extension service timber-marketing specialists.

MORPHOLOGY AND GENESIS OF SOILS

FACTORS OF SOIL FORMATION

Soil is the product of soil-forming processes acting on materials deposited or accumulated by geologic agencies. The characeristics of the soil at any given point are determined by (1) the composition of the parent material; (2) the climate under which the soil material has accumulated and existed since accumulation; (3) the plant and animal life on and in the soil; (4) the relief, or lay of the land; and (5) the length of time the forces of soil development have acted on the soil material. Climate is most important in soil development as it affects temperature and moisture conditions within the soil.

Climate and vegetation are the active factors of soil genesis. They act on the parent material and change it into a body having definite soil characteristics. The effects of climate and vegetation on the parent material are conditioned by relief, which influences drainage, the quantity of water that percolates through the soil, the rate of erosion, and the kind of vegetation that grows on the soil. The nature of the parent material also affects the kind of profile that can be formed. Time is also needed for changing the parent material into soil. Usually a long interval is required for the development of distinct soil horizons.

The factors of soil genesis are so closely associated in their effects on the soil that few generalizations can be made regarding the effects of any one factor alone. The factors are so complex in their interrelationships that many of the processes that take place in the development of the soils are not known.

PARENT MATERIAL

The parent materials of soils of Morgan County may be considered in two broad classes: (1) Material residual from the weathering of rocks in place; and (2) material transported by water or gravity and laid down as unconsolidated deposits of clay, silt, sand, and large rock fragments. Material of the first class is usually related directly to the underlying rocks; and material of the second class, to the soils or rocks at some other location from which they were derived.

Residual parent materials.—In Morgan County the residual parent materials have weathered from consolidated sedimentary rocks, mainly limestone and sandstone. The properties of these materials are strongly reflected in many of the characteristics of the soils that have developed from them. Geologically, the rocks are very old; they belong to the Carboniferous period. The limestone and sandstone formations belong to the Mississippian series, and the sandstone and shale formation of Sand Mountain belong to the Pennsylvanian series (*1*). These formations were laid down as unconsolidated sediments and were gradually converted into consolidated rock. The formations are essentially level but have a slight regional dip to the west and the south.

The soils developed from residuum are generally associated with particular rock formations or parts of them. In the Tennessee Valley section of the county, the soils of the Decatur and Dewey series are generally associated with Warsaw limestone and St. Louis limestone or Tuscumbia limestone. In both the Tennessee Valley and the Moulton-Cotaco Valley, the soils of the Colbert series and Talbott series are derived from the Pennington formation or Bangor limestone. The Tilsit, Pearman, and Christian soils of the Little Mountain plateau have formed from material derived from the Golconda formation or Hartselle sandstone. On Sand Mountain, the soils of the Hartsells series and Enders series have developed from material weathered from the Pottsville formation. The Pottsville formation belongs to the Pennsylvanian series, whereas all of the other formations belong to the Mississippian.

Sequence of geologic formations.—Warsaw limestone has an exposed thickness of about 100 feet and a total thickness probably not in excess of 200 feet. It is a massive gray to dark-gray, coarsely crystalline, nondolomitic, highly fossiliferous limestone that weathers to a cherty residuum. It is overlain by the St. Louis limestone, which makes its appearance in the longitude of Decatur and thickens toward the eastern part of the county. The St. Louis limestone is lithologically similar to the underlying Warsaw and with it forms the Tuscumbia limestone.

St. Genevieve limestone overlies the St. Louis limestone. Within the county it is composed of oolitic limestone that includes a small amount of interbedded shaly marl. It is thought that the St. Genevieve limestone has had little or no influence on the soils of the county.

Succeeding the St. Genevieve limestone is the Gasper formation, about 100 feet in thickness. It is composed of marl and has limestone beds at the top and bottom. In places these limestone beds make up about half of the total thickness of the formation.

Hartselle sandstone of the Little Mountain plateau rests upon the Gasper. It is thickest in the western part of the county, thins toward the eastern part, and disappears near the Morgan-Marshall county line. This formation is about 60 feet thick at Valhermoso Springs but is thinly bedded in some parts of the county (pl. 1, *A*).

Bangor limestone of the Moulton-Cotaco Valley overlies the Hartselle sandstone. It has a maximum thickness of about 500 feet within the county. It is blue-gray, massive, thick-bedded crystalline and oolitic limestone that contains cherty layers and much chert upon weathering. In large part the Talbott and Colbert soils of the county

have been formed in residuum from the Bangor limestone. It is thought that a thin layer of Tuscumbia limestone overlies the Bangor in the vicinity of Danville and gives rise to the more or less shallow areas of the Decatur and Dewey soils. The Bangor limestone contains a rather high percentage of clay, and this clay is probably responsible for the formation of the heavier and more acid soils in the Moulton-Cotaco Valley.

The Pottsville formation, of Pennsylvanian age, on the Sand Mountain plateau, rests on the Bangor limestone. The Pottsville formation is composed of sandstone and shale and contains at least two thin seams of coal. Its maximum thickness is about 300 feet. There is less shale influence in the soil profile in the eastern part of the county where the more typical Hartsells and the Muskingum soils are located, than in the southern part of the county. Along the Cullman County line to the south the sandstone and shale are thinly interbedded and give rise to the more typical Enders and Pottsville soils.

Transported materials.—More soil series in this county have developed from transported materials than from residual materials. Although these transported materials originated in the uplands underlain almost wholly by either limestone or sandstone and shale, they differ somewhat within each group, depending on the composition of the uplands, the amount of mixing of limestone and sandstone materials, age, and drainage conditions. These differences are reflected in some of the characteristics of the soils.

General alluvium consisting predominantly of materials weathered from limestone has given rise to soils belonging to the Cumberland, Etowah, Wolftever, Captina, Capshaw, Tupelo, Taft, Robertsville, Huntington, Egam, Lindside, Dunning, and Melvin series. The Huntington, Egam, Lindside, Dunning, and Melvin soils occupy first bottoms near streams, and the other soils of this group occupy stream terraces or second bottoms.

Soils of the Abernathy, Ooltewah, and Guthrie series have formed from local colluvial and alluvial materials. General alluvium consisting predominantly of sandstone and shale materials has given rise to soils belonging to the Waynesboro, Nolichucky, Sequatchie, Holston, Monongahela, Tyler, Pope, Bruno, Philo, and Atkins series. The Waynesboro, Nolichucky, Sequatchie, Holston, Monongahela, and Tyler soils occupy stream terraces, and the other soils of this group occupy first bottoms near streams.

Soils of the Allen, Jefferson, Barbourville, Cotaco, and Lickdale series and Cobbly colluvium have formed from local alluvium and colluvium, or waste and slough deposited at the base of immediate slopes.

Although a rather consistent relationship exists between the kinds of parent material and some characteristics of the soils, other soil characteristics, especially those of regional significance to soil genesis, are not related to parent material and must be attributed to the other factors of soil formation.

CLIMATE

Morgan County has a continental and temperate climate. Summers are long and warm and the winters are short and mild. The rainfall is moderately high. Summer temperatures favor rapid chemical re-

actions under the moist conditions that exist in the soil most of the time. The heavy rains favor rather intense leaching of soluble materials and colloidal matter downward in the soil. Moreover, the ground is frozen for only short periods and to only shallow depths, so the processes of weathering are intensified and the translocation of materials is accelerated.

Climatic conditions vary somewhat within the county. The temperatures on Sand Mountain and, to lesser extent on Little Mountain, are lower than in other parts of the county. The average growing season in the valley is 225 days, but on the mountains it is a little shorter and the soil is frozen more often and for longer periods.

Green plants, micro-organisms, earthworms, and other forms of life are on and in the soils and contribute toward the soil-building process. The changes they bring about depend, among other things, on the kinds of life present and the life processes peculiar to each. The kinds of plants and animals that live on and in the soil are determined by environmental factors, such as climate, parent material, relief, age of the soil, and other organisms. The influence of climate is most apparent, but not always most important, in determining the kinds of higher plants that grow on the well-drained, well-developed soils. Climate and vegetation acting together are the active factors of soil genesis.

PLANT AND ANIMAL LIFE

In the early days an oak-hickory-chestnut forest association covered the well-drained, well-developed soils of the limestone valleys, and an oak-hickory-pine forest was on the well-drained, well-developed soils of the sandstone plateaus. There were probably differences in the density of forest stands, the proportion of species, and the associated ground cover. The vegetative cover probably differed most between Sand Mountain and the Tennessee Valley, where the greatest variations in climate and soil also occurred. It is doubtful, however, that the few marked differences in properties among the well-drained, well-developed soils of the county can be the direct result of differences in the vegetative cover.

The trees common to this area feed on plant nutrients moderately deep in the soil. Most of them shed their leaves annually. Although the plant-nutrient content differs considerably among species, the leaves of deciduous trees and plants are generally higher in phosphorus and bases than the needles from coniferous trees. Since deciduous trees dominate in the county, essential plant nutrients are returned to the upper part of the soil from the lower part and counteract the depleting action of the percolating waters.

Large quantities of organic matter are added to the soil in the form of dead leaves, roots, twigs, and whole plants. Most of it is added to the topmost layer, or A horizon, where it is acted on by micro-organisms, earthworms, and other forms of life, and by direct chemical reactions. In Morgan County, such materials decompose rapidly as a result of high temperature and moisture, favorable character of the organic matter itself, and presumably favorable micropopulation of the soil. Organic material does not accumulate on well-drained sites in the valleys to the extent that it does in cooler regions that have similar drainage.

Little is known of the micro-organisms, earthworms, and other forms of life in the soil, but their importance is probably no less than that of the higher plants.

DEGREE OF SOIL DEVELOPMENT

Soils are placed in three orders—zonal, azonal, and intrazonal.

Zonal soils are the well-drained, well-developed soils that have formed under nearly uniform conditions of climate and vegetation. Their parent material has been in place a long time without being subject to extremes of relief. On these soils climate and vegetation have had the greatest influence, and relief and age the least. As a result, the soils, though developed from various kinds of parent material, have many properties in common.

Uncultivated areas of all the well-drained, well-developed soils have a surface layer of organic debris in varying stages of decomposition. All have dark-colored A_1 horizons, and the A_2 horizons are lighter in color than either the A_1 or the B. In general, the B horizon is uniformly colored yellow, brown, or red and is heavier textured than the A_1 or A_2. The C horizon is variable in color and texture among the different soils, but it is usually red, brown, or yellow, mottled with gray or brown.

Azonal soils occur where the parent material has been in place only a short time; for example, where very recently transported materials have been deposited. The soils have very poorly defined or no genetic horizons. Such soils are young and have few or none of the properties of zonal soils. They are therefore called azonal soils. Azonal soils lack well-developed soil characteristics because they are young or because the parent material or relief is such that they have been prevented from developing definite soil characteristics.

Azonal soils of this county are characterized by (1) A_1 horizons that are moderately dark, very dark, or olive black and apparently moderate to high in content of organic matter; (2) by the absence of a zone of illuviation, or B horizon; and (3) by parent material that is usually lighter in color than the A_1 horizon. The parent material may be similar to, lighter than, or heavier than the A_1 horizon in texture. Azonal soils may be referred to as A–C soils because they do not have a B horizon.

Azonal soils occur on some of the hilly and steep areas, as well as on areas of comparatively level, newly transported materials. In steep areas the amount of water percolating through the soil is relatively small. A large amount of water rapidly runs off the soil and contributes to relatively rapid geologic erosion. The soils therefore are young. The materials are constantly renewed or mixed, and the changes brought about by vegetation and climate may be so slight that the soils are essentially A–C, or azonal.

Intrazonal soils occur on level areas where internal and external drainage are restricted or where geologic erosion is very slow. These soils have been in place a long time but have certain well-developed profile characteristics that do not exist in zonal soils. Such soils are associated geographically with the zonal soils and are called intrazonal soils. They have more or less well-developed soil characteristics that reflect the dominating influence of some local factor of parent material or relief over the normal effects of climate and vegetation. The properties of such soils in this county are generally the result of

level relief influenced greatly by the character of the parent material and by the kinds of vegetation that grow in such an environment.

Soils of each of the three broad classes—zonal, azonal, and intrazonal—may be derived from similar kinds of parent material. Within any one of these classes in the county, major differences among soils appear to be closely related to differences in the kinds of parent materials from which the soils were derived. The thickness of soils developed from residual materials appears to be closely related to the volume of the residue after weathering, and to the rate of geologic erosion. The chemical and physical nature of the parent material modifies the rate and direction of chemical changes induced by climate and vegetation. The kind of parent material also exerts a pronounced influence on the kinds of vegetation that grow on the soil.

Rocks have contributed to differences among soils through their effects on relief. The rocks of much of Morgan County are moderately old formations that lie almost horizontally. The present relief probably results from the geologic weathering and erosion of these formations. The higher lands are capped by the more resistant rocks, whereas the valleys are underlain by those less resistant. The plateaus of Morgan County are capped with sandstone and sandstone and shale; and the valleys are underlain by more or less pure limestone.

Decatur, Dewey, Colbert, and Talbott soils are in the valleys. Hartsells, Enders, Linker, Hanceville, and Crossville soils are generally on the higher sandstone plateaus; and Tilsit, Johnsburg, Pearman, and Christian soils are on the lower plateaus of the Little Mountain. The soils of the Pearman and Christian series are more closely related to the soils of the valley than to other soils of the county.

The nearly level and undulating areas over both limestone and sandstone have exceptionally good internal drainage because the water is carried away through crevices and caverns in the rocks and by percolation through the rock itself. This underground drainage partially counteracts the usual effects of level relief on drainage and allows the nature of the parent rock to dominate in determining local differences among the well-drained soils formed from residual materials—soils that are subject to similar forces of climate and vegetation in Morgan County.

CLASSIFICATION OF SOILS

In table 7 the soil series of Morgan County are classified by order and great soil group, and the relief, source, and kind of plant material, and soil age are given for each. In the following pages the great soil groups of the county are discussed and the soil series in each group are described.

GREAT SOIL GROUPS

The classification of the soil series in higher categories is based upon very limited data, principally those characteristics that can be observed in the field. An attempt has been made to place each series in the correct great soil group, but further study may prove the classification to be incorrect in some instances.

Morgan County is in the region of Red-Yellow Podzolic soils, and contains zonal order soils of that great soil group. The intrazonal order is represented by soils of the Planosol and Rendzina great soil groups; and the azonal order, by soils of the Alluvial and Lithosol great soil groups.

TABLE 7.—*Soil series of Morgan County, Ala., classified by higher categories, and fa*
to differences in their morphology

ZONAL SOILS

Great soil group and series	Parent material	Relief	
Red-Yellow Podzolic:			
Red members:	Residuum from—		
Decatur	High-grade limestone	Undulating to rolling	Old
Dewey	High-grade limestone	Undulating to hilly	Old
Talbott	Moderately clayey limestone	Undulating to hilly	Old
Christian	Limestone and sandstone (interbedded).	Undulating to rolling	Me
Hanceville	Sandstone and shale	Undulating to rolling	Old
Linker	Sandstone and shale	Undulating to hilly	Old
	General alluvium from—		
Cumberland	Limestone	Nearly level to rolling	Old
Etowah	Limestone	Nearly level to undulating	Me
Waynesboro	Sandstone and shale	Undulating to rolling	Old
Sequatchie	Sandstone and shale	Nearly level to undulating	Yo
Nolichucky	Sandstone and shale	Level to hilly	Ver
	Colluvium and alluvium from—		
Allen	Sandstone and shale	Undulating to hilly	Old
Yellow members:	Residuum from—		
Colbert [2]	Clayey limestone	Nearly level to hilly	Yo
Crossville	Sandstone and some shale	Undulating	Yo
Hartsells	Sandstone and some shale	Undulating to rolling	Me
Enders	Shale and sandstone (interbedded).	Undulating to rolling	Me
	General alluvium from—		
Capshaw	Limestone	Nearly level to undulating	Me
Holston	Sandstone	Level to rolling	Old

Jefferson	Colluvium and local alluvium from— Sandstone and shale (interbedded).	Nearly level to rolling	Old
	Intrazonal Soils		
Planosols:			
Johnsburg	Residuum from— Sandstone and shale (interbedded).	Nearly level to undulating	Ver
Pearman	Sandstone and limestone, mainly.	Nearly level to hilly	Old
Tilsit	Sandstone and shale (interbedded).	Nearly level to rolling	Ver
	General alluvium from—		
Wolftever	Limestone	Level to undulating	Yo
Captina	Limestone	Nearly level to undulating	Old
Taft	Limestone	Nearly level	Old
Tupelo	Limestone	Nearly level	Old
Monongahela	Sandstone and shale	Nearly level	Old
Robertsville	Limestone	Nearly level to level	Ver
Tyler	Sandstone and shale	Nearly level to level	Ver
	Colluvium and local alluvium from—		
Guthrie [3]	Limestone	Nearly level to depressional	Ver
Lickdale	Sandstone and shale	Nearly level to level	Ver
Rendzina soils:			
Hollywood	Colluvium and local alluvium from limestone.	Level to undulating	Yo
	Azonal Soils		
Lithosols:			
Pottsville	Residuum from— Sandstone and shale (interbedded).	Hilly to steep	Yo
Hector	Sandstone and shale (interbedded).	Hilly to steep	Yo
Muskingum	Sandstone and shale (interbedded).	Rolling to steep	Yo

See footnotes at end of table.

TABLE 7.—*Soil series of Morgan County, Ala., classified by higher categories, and fo to differences in their morphology*—Continued

AZONAL SOILS—Continued

Great soil group and series	Parent material	Relief	
Alluvial soils:	General alluvium from—		
Huntington	Limestone	Nearly level to level	Ver
Lindside	Limestone	Nearly level to level	Yo
Melvin	Limestone	Nearly level to level	Yo
Egam	Limestone	Nearly level to level	Yo
Dunning	Limestone	Nearly level to level	Yo
Pope	Sandstone and shale	Nearly level to level	Ver
Philo	Sandstone and shale	Nearly level to level	Ver
Atkins	Sandstone and shale	Nearly level to level	Yo
Bruno	Sandstone and shale	Nearly level to level	Ver
	Local colluvium and alluvium from—		
Abernathy	Limestone	Nearly level to level	Ver
Ooltewah	Limestone	Nearly level to level	Ver
Barbourville	Sandstone and shale	Nearly level to level	Ver
Cotaco	Sandstone and shale	Nearly level to level	Ver

[1] Age as used in this table, refers to the length of time the soil material appears to have be profile development as evidence. A very young soil has few if any of the characteristics of characteristics weakly developed; a medium soil has them developed to a moderate degree; an ol very old soil commonly has them more intensely developed.

[2] This soil is on the borderline between the zonal yellow podzolic members of the Red-Yell Lithosol great soil group because of relatively shallow and variable depth to bedrock, variable d of the profile layers. It is frequently described as being lithosolic.

[3] As mapped, this series is predominantly in the Planosol great soil group. Many areas, h soil group.

RED-YELLOW PODZOLIC SOILS

The Red-Yellow Podzolic great soil group consists of well-developed, well-drained acid soils having thin organic A_0 and organic-mineral A_1 horizons over a light-colored, bleached A_2 horizon, over a red, yellowish-red, or yellow and more clayey B horizon. In this report the soil series of the Red-Yellow Podzolic great soil group have been divided as red members and yellow members according to the color of the clayey B horizon.

RED MEMBERS

Soils of the Decatur, Dewey, Talbott, Cumberland, Waynesboro, Hanceville, Allen, Christian, Etowah, Linker, Nolichucky, and Sequatchie series are red members of the Red-Yellow Podzolic great soil group. All of these soils apparently have developed under fairly similar conditions of climate and vegetation. The Etowah, Sequatchie, and Linker soils are probably more weakly developed than the others of the group.

All the red members of the Red-Yellow Podzolic great soil group are at least moderately well drained. They range somewhat in degree of maturity but all are sufficiently old to have at least a moderately well developed profile. They range from undulating to rolling and from gently sloping to sloping, but slope is not altogether the cause of differences among the soils. There are marked differences in parent materials that explain many of the differences among the soil profiles.

Decatur series

The Decatur soils are probably the most fertile soils in the county that have a mature profile. The Decatur soils come from high-grade limestones that are a little higher in insoluble impurities, especially silica, than the limestone underlying the Talbott soils. Most of the Decatur soils have developed on undulating and gently rolling upland areas. They have the darkest A horizon of the well-developed soils in the valley—an indication of a high content of organic matter. Because of their fertility, it is reasonable to assume that they supported the most luxuriant forest vegetation, which would account for the dark color and granular structure of the A horizon. This luxuriant growth would also inhibit erosion of the surface soil and subsoil.

Decatur soils have deep solums and are among the darkest red soils in the valley. In this county they probably have the best combination of soil characteristics for plant growth of the soils of the uplands.

Representative profile of a comparatively uneroded Decatur silt loam:

A_1 0 to 2 inches, weak reddish-brown to dark-brown, smooth, mellow and friable silt loam that breaks into soft granules; contains many small roots and some insects.

A_2 2 to 10 inches, brown to medium-brown friable silt loam to silty clay loam; contains some brown concretions; moderately low in organic matter; weakly developed fine to medium nut structure.

B_1 10 to 21 inches, moderate reddish-brown moderately friable silty clay; breaks into angular aggregates that, under optimum moisture conditions, are fairly easy to crush into a smooth uniform plastic mass; contains many roots and brown concretions; low in organic matter.

B_2 21 to 39 inches, strong reddish-brown silty clay; breaks into a blocky structure when dry but is plastic and sticky when wet; moderately friable but firm in place; contains some fine roots and wormholes; low in organic matter.

B_3 39 to 65 inches, strong-brown, dense, firm clay; contains some chert fragments ¼ to ½ inch in diameter, which increase with depth.

C 65 inches +, moderate-red to weak-red heavy, tight, mottled clay; contains numerous chert fragments ¼ to 2 inches in diameter; limestone bedrock at depths of 8 to 12 feet or more.

The entire profile is medium acid in reaction.

Dewey series

The Dewey soils are developed from limestones that are apparently higher in insoluble impurities, particularly silica, than the rocks underlying the Decatur soils.

Representative profile of a Dewey silt loam:

A_1 0 to 2 inches, dark-brown mellow silt loam; crumbles readily into soft granules; high organic-matter content.

A_2 2 to 11 inches, moderate-brown to brown mellow friable silt loam; granular in structure; contains a moderate amount of organic matter.

B_1 11 to 18 inches, strong-brown friable heavy silty clay loam; breaks into small soft granules that are easily crushed to a smooth mass; moderately sticky when wet.

B_2 18 to 36 inches, strong-brown to reddish-brown silty clay, moderately firm but friable; breaks into irregular-sized, subangular aggregates that are fairly easily crushed to a smooth light reddish-brown mass; slightly plastic when wet; contains many small round rust-brown concretions and small chert fragments.

B_3 36 to 62 inches, strong-brown to pale reddish-brown moderately friable silty clay with occasional splotches of weak brown and light yellow; moderately firm in place; displaced material breaks into angular and subangular aggregates, which under moderate pressure crush to a smooth reddish-yellow moderately plastic and sticky mass; contains numerous small chert fragments and some brown concretions.

C 62 inches +, reddish-brown, heavy stiff plastic and sticky clay mottled with yellow, gray, and red; contains numerous chert fragments ranging from ¼ to 2 inches across; breaks into angular aggregates.

Talbott series

The Talbott soils are underlain by limestone that contains some clay but is low in siliceous material. The solum is not so deep as that of the Decatur or Dewey soils, and the subsoil is more plastic and sticky.

As the rock floor is very uneven and jagged, the depth to bedrock is variable but generally only a few feet. Rock outcrops are common. In fact, most of the stony land types in the valley have Talbott-like soil between the outcrops wherever the depth to bedrock is deep enough to allow a soil to develop. Because of their variable depth to bedrock, Talbott soil layers between the A_2 horizon and the bedrock differ greatly in depth and in many places are almost entirely absent.

Most of the Talbott soils are undulating or rolling, but some are hilly. It is probable that some of the Talbott soils on the steeper slopes were derived from rocks that would have given rise to Dewey soils if they had been on milder slopes. The Talbott profile has developed because natural erosion has been too rapid. Nevertheless, considering the forest vegetation that covered both series, it is unlikely that difference in relief very often accounted for differences between Talbott and Decatur soils. Talbott soils are strongly acid throughout.

Typical profile of a Talbott silt loam:

A_1 0 to 3 inches, brownish-gray to weak-brown mellow silt loam; contains a moderate amount of organic matter.
A_2 3 to 7 inches, moderate-brown silty clay loam; readily falls apart into soft crumbs of various sizes and shapes; contains many roots.
B_2 7 to 18 inches, weak reddish-brown heavy plastic and sticky clay; difficult to disrupt and breaks into firm, angular, or blocky brown aggregates; strongly plastic when wet.
B_3 18 to 30 inches, light-brown heavy plastic and sticky clay, faintly mottled with yellow, gray, and rust brown; contains numerous rust-brown concretions; strongly plastic when wet.
C_1 30 to 38 inches, heavy sticky and plastic clay, highly mottled with yellow, gray, and brown; contains many rust-brown concretions.
C 38 inches to bedrock, light yellowish-brown very heavy, tough, plastic clay, intensively mottled with gray, yellow, and reddish brown; limestone bedrock ordinarily at depths of 3 to 5 feet.

Christian series

Soils of the Christian series are moderately well developed red members of the Red-Yellow Podzolic group. They generally occur on the southern rim of Little Mountain. They have developed from interbedded sandstone and limestone, with possibly some influence from shale. In places, profile characteristics are similar to those of the Talbott soils except that the A horizon and the upper part of the B contain a higher percentage of sand. The Christian soils are undulating to rolling and strongly acid throughout their entire depth.

Representative profile of a Christian loam:

A_1 0 to 2 inches, light brownish-gray friable loam; contains moderate amount of organic matter.
A_2 2 to 8 inches, moderate yellowish-brown friable heavy loam to silt loam.
B_1–B_2 8 to 28 inches, reddish-brown to strong-brown silty clay; compact or firm in place, but moderately friable; breaks to a nut structure; somewhat plastic and sticky when wet.
B_3 28 to 66 inches, light-brown very compact silty clay, splotched or mottled with gray, rust brown, and reddish brown; plastic and sticky when wet.
C 66 to 84 inches, light yellowish-brown, mottled with gray and rust brown, heavy sticky, plastic clay; massive structure.

Hanceville series

Hanceville soils have a well-developed, mature zonal profile. They occupy the sandstone plateaus and were derived mainly from sandstone, with probably some influence from shale.

The Hanceville soils, along with the other sandy red soils—Waynesboro, Allen, Linker, Sequatchie, and Nolichucky—are strongly to very strongly acid and are low in mineral plant nutrients. The Linker, Sequatachie, and Nolichucky are less red than the others, especially in the A horizon, but are similar in slope, drainage, profile development, and original forest cover. The Hanceville and Linker soils occupy upland positions; the Waynesboro, Nolichucky, and Sequatchie soils from alluvial materials lie on terraces; and the Allen soils are mainly colluvium deposited at the base of long slopes or mountains.

Typical profile of a Hanceville fine sandy loam:

A_1 0 to 2 inches, light grayish-brown nearly loose fine sandy loam; organic matter, moderately high.
A_2 2 to 6 inches, moderate yellowish-brown friable fine sandy loam; organic matter, moderately low.

B_1 6 to 18 inches, weak reddish-brown friable fine sandy clay loam; readily breaks into a soft crumb structure; organic matter, low.

B_2 18 to 58 inches, moderate reddish-brown moderately fine sandy clay to fine sandy clay loam; firm in place; readily breaks into a friable mass of small crumb aggregates.

C 58 to 66 inches, moderate reddish-brown slightly cemented loamy fine sand, splotched with grayish brown; readily breaks under little pressure into a single grain structure; underlying material varies from partially weathered brownish-gray to gray fine-grained sandstone to solid sandstone bedrock.

Linker series

The Linker soils are well drained and occur on the sandstone plateaus. They are less red than the Hanceville soils but have similar profile structure and consistence.

Typical profile of a Linker fine sandy loam:

A_1 0 to 2 inches, light yellowish-brown moderately loose fine sandy loam; contains some organic matter, especially in the top inch.

A_2 2 to 15 inches, yellowish-brown friable fine sandy loam; breaks to a soft crumb structure.

B_1–B_2 15 to 37 inches, light-brown to moderate reddish-brown heavy fine sandy loam to fine sandy clay; slightly firm in place but friable; contains some small sandstone fragments and a few yellowish-brown splotches.

B_3 37 to 48 inches, moderate reddish-brown friable fine sandy loam.

C 48 inches +, yellowish-brown loamy fine sand; contains many sandstone fragments ¼ to 6 inches or more in size; rests on partially weathered sandstone or sandstone bedrock.

Cumberland series

Soils of the Cumberland series occupy the older and higher terraces in the county. The parent material is believed to have been washed largely from land underlain by limestone. The profile resembles those of Decatur and Dewey soils; the main difference lies in origin of the parent material. Waterworn gravel is common to the Cumberland soils in many places. The soils are medium to strongly acid throughout the profile.

Typical profile of Cumberland silt loam:

A_1 0 to 2 inches, brownish-gray to brown friable silt loam; high content of organic matter.

A_2 2 to 14 inches, moderate yellowish-brown to strong-brown friable silt loam; moderately low in organic matter.

B_1 14 to 40 inches, moderate brown to reddish-brown silty clay loam; firm but friable.

B_2 40 to 48 inches, moderate reddish-brown to strong reddish-brown silty clay; compact but moderately friable.

C 48 inches +, reddish-brown silty clay mottled with yellow and gray; moderately compact but friable under optimum moisture conditions; contains some waterworn gravels and a few small chert fragments at a depth of about 60 inches.

Etowah series

The moderately well drained soils of the Etowah series are on low alluvial terraces along the Tennessee River and its larger tributaries. Like the Cumberland series, the Etowah soils have developed from materials washed largely from land underlain by limestone. They have a similar consistence, but the Etowah soils have younger and immaturely developed profiles and are not so red.

Typical profile of an Etowah loam:

- A_1 0 to 5 inches, brown to grayish-brown mellow friable loam; contains a moderate amount of organic matter.
- A_2 5 to 12 inches, moderate to strong brown friable silt loam; breaks into a soft crumb structure; contains some small rounded gravel.
- B_1 12 to 31 inches, moderate-brown to strong-brown silty clay loam; slightly firm in place but readily breaks into friable crumb or nut structure; contains numerous small rust-brown concretions.
- B_2 31 to 46 inches, moderate-brown silty clay mottled with rust brown, pale yellow, and gray; compact but moderately friable; contains numerous small rust-brown concretions.
- C 46 inches +, yellowish-brown silty clay mottled with gray, yellow, and rust brown; breaks to angular fragments of various sizes; moderately friable under optimum moisture conditions.

Waynesboro series

Soils of the Waynesboro series occupy old high terraces in the limestone valleys. The parent material is thought to have been washed chiefly from soils underlain by sandstone and shale. The profile resembles those of the Allen soils in many respects, the main differences being in the position occupied and mode of deposition of the materials. Waterworn rounded gravel is common in the Waynesboro series, whereas angular sandstone fragments characterize the Allen soils. Nearly all of the Waynesboro soils in the county are eroded.

Representative profile of a Waynesboro fine sandy loam:

- A 0 to 7 inches, moderate yellowish-brown nearly loose fine sandy loam; low organic-matter content.
- B_1 7 to 27 inches, moderate-brown to reddish-brown friable fine sandy clay; weak blocky structure.
- B_2 27 to 60 inches, moderate reddish-brown clay loam; moderately compact; breaks easily into a friable mass.
- C 60 inches +, yellowish-brown clay loam to silty clay loam, mottled with gray and reddish brown; compact but friable.

Sequatchie series

The Sequatchie series consists of moderately well drained, weakly developed soils on low stream terraces. They have developed from sandstone and shale materials. Their profiles are not so well developed as those of the Waynesboro soils, but they are quite similar to the Etowah soils in color, drainage, and profile development. They are strongly acid throughout.

Representative profile of Sequatchie fine sandy loam:

- A_1 0 to 5 inches, weak-brown to yellowish-brown fine sandy loam; organic-matter content, moderately low.
- A_2 5 to 10 inches, moderate yellowish-brown friable fine sandy loam.
- B_1 10 to 20 inches, light-brown friable heavy fine sandy loam; weakly developed nut structure.
- B_2 20 to 42 inches, light-brown to yellowish-brown fine sandy clay loam; slightly compact but friable; breaks into a weakly developed blocky structure; a few gray and rust-brown splotches in the lower part.
- C 42 to 54 inches, yellowish-brown sandy clay loam to fine sandy clay, mottled with gray and rust brown, compact but friable.

Nolichucky series

The soils of the Nolichucky series have developed on old high stream terraces derived mostly from sandstone and shale. They are similar to Waynesboro soils in profile characteristics except that the

color of their surface and subsurface layers is lighter. The soils are strongly acid in many areas and contain numerous waterworn quartz pebbles.

Typical profile of a Nolichucky fine sandy loam:

- A_1 0 to 6 inches, light brownish-gray to light yellowish-brown fine sandy loam; contains a moderate amount of organic matter, especially in the upper inch.
- A_2 6 to 10 inches, moderate yellowish-brown friable fine sandy clay loam; breaks into a weak nut structure.
- B_1 10 to 22 inches, pale reddish-brown friable fine sandy clay; breaks into a nut structure.
- B_2 22 to 44 inches, moderate reddish-brown to red silty clay; firm in place but moderately friable; breaks into a nut structure.
- C 44 to 54 inches, moderate-red silty clay mottled with gray and pale yellow; mottlings increase with depth; moderately firm in place, but friable.

Allen series

The soils of the Allen series occur on foot slopes, mainly in the limestone valleys. They were derived largely from sandstone materials that have tumbled or washed from sandstone plateaus. The well-drained slopes range from undulating to hilly. Allen soils are strongly acid throughout and are similar to the Waynesboro soils in profile characteristics.

Typical profile of an Allen fine sandy loam:

- A_1 0 to 5 inches, brownish-gray loose fine sandy loam; contains a considerable amount of organic matter.
- A_2 5 to 12 inches, light-brown friable fine sandy loam; low content of organic matter.
- B_1–B_2 12 to 38 inches, pale reddish-brown friable fine sandy clay; breaks into well-formed irregular angular to subangular fragments; cleavage lines definite and usually well coated with dark red material.
- B_3 38 to 52 inches, weak reddish-brown friable fine sandy loam; slightly firm in place; contains many small sandstone fragments.
- C 52 inches +, light-brown fine sandy loam splotched with red, gray, and pale yellow; contains numerous sandstone fragments up to 3 inches in diameter.

YELLOW MEMBERS

The yellow members of the Red-Yellow great soil group in this county are the Colbert, Crossville, Hartsells, Enders, Capshaw, Holston, and Jefferson soils. All have developed under similar climate and vegetation and are mature or nearly so. Internal drainage for some of these soils is somewhat more impaired than for the red members. Slopes range from nearly level to hilly. The chief morphological differences are in parent rock and in mode of origin of the parent material. The parent rock varies from limestone or interbedded sandstone and shale to sandstone.

Colbert series

The soils of the Colbert series have developed in place from limestone of high clay content, chiefly from the Bangor formation. Most of the areas are in the Moulton-Cotaco Valley, although some are on the northern foot slopes of Little Mountain. Internal drainage is noticeably impaired, as compared to that of the Decatur and Dewey soils. Slopes range from nearly level to hilly. The soils are strongly to very strongly acid throughout the profile, though the underlying rock is calcareous.

Typical profile of a virgin Colbert silt loam:

A_1 0 to 2 inches, brownish-gray friable silt loam; moderately high content of organic matter.
A_2 2 to 6 inches, light yellowish-brown heavy silt loam to silty clay.
B_2 6 to 20 inches, moderate to light yellowish-brown heavy sticky and plastic clay mottled with brown and gray.
C_1 20 to 45 inches, mottled weak yellow, gray, and brown heavy plastic, sticky clay.
C 45 to 55 inches, mottled weak-yellow, gray, and light-brown heavy, sticky, plastic clay; contains some small lime nodules; rests on limestone bedrock.

Crossville series

The soil of the Crossville series is, in places, a Lithosol and contains numerous imperfectly weathered sandstone fragments. In other places it is a shallow intrazonal soil relatively free from sandstone fragments in the A and upper B horizons. It occupies somewhat lower positions than the Hartsells and Linker soils, with which it is closely associated, but it is not well drained.

Representative profile of Crossville loam:

0 to 3 inches, brownish-gray mellow loam.
3 to 15 inches, weak reddish-brown friable fine sandy clay.
15 to 25 inches, moderate reddish-brown friable fine sandy clay; underlain by partially weathered sandstone or sandstone bedrock.

Hartsells series

The soils of the Hartsells series were developed in place over sandstone of the Pottsville formation. They generally occupy the ridgetops in association with the Enders and Linker soils on the Sand Mountain plateaus. They are lighter colored and have a coarser textured profile than the Enders soils. The slopes are undulating to rolling.

Typical profile of a virgin Hartsells fine sandy loam:

A_1 0 to 2 inches, light brownish-gray nearly loose fine sandy loam.
A_2 2 to 13 inches, yellowish-brown to dusky yellow friable fine sandy loam; soft crumb structure.
B_1 13 to 26 inches, moderate yellowish-brown fine sandy loam to very fine sandy loam; breaks easily into a friable mass.
B_2 26 to 32 inches, light yellowish-brown slightly compact fine sandy loam; more or less single-grain structure.
C_1 32 to 46 inches, splotched or mottled pale-yellow, gray, and rust-brown fine sand to loamy fine sand; semicemented or compact but easily breaks to a single-grain structure.
C_2 46 inches +, light yellowish-brown slightly compact loamy sand splotched with gray; contains some sandstone fragments ¼ to 3 inches or more in diameter; rests on sandstone bedrock in many places.

Enders series

The Enders soils were developed in place over thinly interbedded sandstone and acid shale of the Pottsville formation. They occur in close association with the Hartsells and Pottsville soils on the Sand Mountain plateaus along the southern part of the county. Their profiles are finer textured and browner than those of the Hartsells series, and internal drainage is slower. The Enders soils occupy undulating to rolling slopes and are very strongly acid throughout.

Representative profile of an Enders loam:

A 0 to 7 inches, light brownish-gray or weak-yellow mellow friable loam; contains some organic matter in top inch.
B_1 7 to 19 inches, moderate yellowish-brown fine sandy clay loam; slightly compact but friable; weak nut structure.

B_2 19 to 28 inches, light-brown to dark-orange very fine sandy clay, splotched with gray and strong brown; compact or dense; crushes into a friable nut structure.

C_1 28 to 52 inches, weak reddish-brown heavy very fine sandy clay mottled with gray and pale yellow: compact and dense: crushes easily into a weak nut structure.

C 52 inches +, stratified reddish-brown, weak-yellow, and gray very fine sandy clay loam; grades into unweathered thinly interbedded sandstone and shale.

Capshaw series

The Capshaw soils are alluvial in origin and were derived largely from limestone materials. They occupy moderately low stream terraces and broad old alluvial fans in the limestone valleys and are closely associated with the Etowah, Taft, and Tupelo soils. Although they are lighter in color, their profile characteristics are somewhat similar to those of Etowah soils. The Capshaw soils are moderately well drained and strongly acid. They occupy nearly level to undulating relief. In this county they are mapped only with Captina soils as undifferentiated units.

Fairly representative profile of a Capshaw silt loam:

A_1 0 to 4 inches, light brownish-gray friable silt loam; contains some organic matter.

A_2 4 to 15 inches, light brownish-gray to yellowish-brown friable silty clay loam.

B_1 15 to 22 inches, moderate yellowish-brown friable silty clay weakly splotched with gray; slightly firm in place; contains many rust-brown concretions.

B_2 22 to 34 inches, weak-yellow silty clay, slightly mottled with gray and rust brown; compact when dry but friable under optimum moisture conditions.

C 34 inches +, yellowish-gray heavy compact silty clay to clay, mottled with pale yellow and rust brown; brittle when dry, and sticky when wet.

Holston series

The soils of the Holston series occupy level, nearly level, undulating, or rolling areas on old intermediate to high terraces. They occur chiefly in the limestone valleys. Their parent materials have been washed chiefly from soils overlying sandstone. Internal drainage is somewhat slower than for Sequatchie or Waynesboro soils but better than for the Monongahela soil. The high lying areas of Holston have numerous waterworn quartz gravel on the surface and throughout the entire profile. The soils are very strongly acid.

Representative profile of a Holston fine sandy loam:

A_1 0 to 7 inches, brownish-gray nearly loose fine sandy loam; contains a moderate amount of organic matter.

A_2 7 to 19 inches, grayish-yellow friable very fine sandy loam to light fine sandy clay.

B_1 19 to 34 inches, yellow to bright-yellow very fine sandy clay; slightly firm but friable; contains splotches of rust brown and gray.

B_2 34 to 72 inches, yellow very fine sandy clay; mottled with gray and rust brown; moderately compact but friable.

C 72 inches +, mottled pale-yellow, gray, and rust-brown very fine sandy clay loam; firm but friable.

Jefferson series

Jefferson soils are deposits that have rolled or washed down to the valley floors from soils developed on interbedded sandstone and shale.

They occupy foot slopes chiefly in the limestone valleys and are nearly level to rolling. The profile characteristics are similar to those of Holston soils on the valley terraces and sometimes it is difficut to separate soils of the two series. Jefferson soils are also closely associated with the Allen, but they differ in profile color. In places internal drainage is slow. The entire profile is strongly acid.

Representative profile of a Jefferson fine sandy loam under virgin forest:

A_1 0 to 3 inches, brownish-gray nearly loose fine sandy loam; relatively high content of organic matter.

A_2 3 to 16 inches, light-brown to moderately yellowish-brown friable fine sandy loam to fine sandy clay loam that breaks into soft crumb-sized aggregates.

B_1 16 to 30 inches, light yellowish-brown fine sandy clay splotched with gray and rust brown; slightly firm in place but friable; contains numerous rust-brown concretions.

B_2 30 to 37 inches, pale-yellow fine sandy clay splotched with rust brown and gray; compact but moderately friable; contains many rust-brown concretions and some small sandstone fragments.

C 37 inches +, fine sandy loam, mottled gray, rust brown, and pale yellow; compact but moderately friable; contains numerous rust-brown concretions and sandstone fragments.

PLANOSOLS

Planosols are an intrazonal group of soils; they have eluviated surface horizons underlain by B horizons that are more strongly illuviated, compacted, or cemented than the B horizons in associated normal, or zonal, soils. They have developed on nearly level uplands under grass or forest vegetation in a humid or subhumid climate. The soils of this great soil group are the Guthrie, Johnsburg, Pearman, Tilsit, Wolftever, Captina, Taft, Tupelo, Monongahela, Robertsville, Tyler, and Lickdale. The Wolftever is less definitely a Planosol than the others.

All of these soils are nearly level to undulating. They are characterized by B horizons more dense or compact than those in most zonal soils. The degree of development for the B horizon varies among the soil series.

Planosols have developed under climate similar to that under which the zonal soils have developed, but Planosols were more moist and less well aerated much of the time. Probably vegetation on the Planosols and the Red-Yellow Podzolic soils was somewhat different, though deciduous forest predominated on both. The Planosols appear to be older than the Red-Yellow Podzolic soils, but the morphologic causes for their more advanced development are not known. The relief is such that geologic erosion is slow, but this alone is not likely the cause for formation of Planosols. Possibly relatively dense layers in the parent materials slowed internal drainage. Slow internal drainage, combined with slow surface drainage and unusual siltiness of the parent material, may have caused abnormal concentration or cementation of material in or below the illuviated, or B, horizon.

Guthrie series

The soil of the Guthrie series has developed either in place over limestone or on local alluvium or colluvium in closed depressions. It is associated with soils underlain by or developed over limestone. It

resembles the Robertsville soil in profile and in very slow internal drainage. The parent rock from which the material for soils of these series weathered was dominantly limestone. Soil of the Guthrie series, as mapped in Morgan County, is considered the most poorly drained of the Abernathy-Ooltewah-Guthrie catena. It is very strongly acid.

Representative profile of Guthrie silt loam:

0 to 5 inches, light-gray or medium-gray friable silt loam splotched with yellowish gray and weak yellow; moderately low in organic matter.
5 to 9 inches, yellowish-gray friable heavy silt loam mottled with light gray and weak yellow; low content of organic matter.
9 to 18 inches, weak-yellow slightly compact silty clay mottled with gray and yellow.
18 inches +, dark-gray clay mottled with olive brown; heavy, compact, and tough.

Johnsburg series

The soil of the Johnsburg series has developed over interbedded sandstone and acid shale of the Hartselle formation. It occurs chiefly on the Little Mountain plateaus. It is associated with the Tilsit soils but is lighter colored in the upper part, is more mottled in the lower part, and has a moderately hard and compact layer in the lower part of the B horizon. The Johnsburg soil is very strongly acid throughout its entire depth.

Representative profile description of Johnsburg loam:

A_1 0 to 6 inches, light brownish-gray mellow loam; contains some organic matter.
A_2 6 to 11 inches, weak-yellow friable silt loam.
B_1 11 to 20 inches, pale-yellow silty clay loam mottled with gray and rust brown; moderately friable; contains some rust-brown concretions.
B_2 20 to 36 inches, pale-yellow silty clay mottled with gray and rust brown; compact and firm in place.
C 36 inches +, mottled gray, pale-yellow, and rust-brown compact silty clay to clay.

Pearman series

The Pearman soils have developed in place over interbedded sandstone and limestone and have been somewhat influenced by acid shale. They occur in relatively close association with Christian and Tilsit soils, and in some places with the Colbert soils. They are on the southern slope of Little Mountain. Compared with Colbert soils, the Pearman have a lighter colored surface layer, a more friable B horizon, and more rapid internal drainage. The Pearman soils are strongly acid.

Typical profile of a Pearman loam:

A_1 0 to 2 inches, light grayish-brown loam; contains some organic matter.
A_2 2 to 8 inches, light yellowish-brown loam to silt loam, mellow and friable.
B_1 8 to 18 inches, moderately yellowish-brown silty clay loam to silty clay; moderately compact but friable; contains a few rust-brown concretions.
B_2 18 to 36 inches, moderately yellowish-brown compact heavy clay of a nut structure; contains some gray and reddish-brown mottlings in the lower part.
C_1 36 to 54 inches, mottled reddish-brown, light yellowish-brown, and gray heavy compact clay.
C_2 54 to 80 inches, light yellowish-brown heavy sticky, plastic clay mottled with reddish brown and gray; contains some rust-brown concretions.

Tilsit series

The Tilsit soils have developed in place over interbedded sandstone and acid shale of the Hartselle formation. All of the soils are on the Little Mountain plateaus. They are characterized by the development of a layer 18 to 26 inches below the surface that retards internal drainage somewhat. The soils are strongly to very strongly acid and nearly level to rolling.

Representative profile of Tilsit silt loam under virgin forest:

A_1 0 to 2 inches, light brownish-gray friable silt loam; moderately high in organic matter.

A_2 2 to 14 inches, light yellowish-brown friable silt loam; breaks easily into a soft crumb structure; organic stains in the upper part.

B_1 14 to 24 inches, moderate yellowish-brown slightly compact but friable silt loam, faintly splotched with gray in the lower part; soft crumb structure.

B_2 24 to 36 inches, light to moderate yellowish-brown compact hard silty clay loam mottled with gray and rust brown; breaks into a nut structure.

C 36 to 54 inches, strong yellowish-brown very compact hard silty clay loam mottled with gray and brown; breaks into a friable mass under optimum moisture conditions.

Wolftever series

The Wolftever soil occupies low terraces in the limestone valleys along the Tennessee River and Flint and Cotaco Creeks. It has developed chiefly from alluvium washed from soils underlain by limestone. It is a young soil and, accordingly, its profile is less well developed than is that of either the Cumberland or Dewey soils.

The Wolftever soil is nearly level to gently sloping. Its external drainage is fair to good, but internal drainage is impeded by the compact layer in the subsoil. It has developed from material similar to the parent material of Etowah soils, and the climate, vegetation, and relief are similar. Internal climate of the Wolftever soil is more moist, however, and aeration is considerably slower. Wolftever soil is strongly acid throughout.

Representative profile of Wolftever silt loam:

A 0 to 5 inches, light grayish-brown smooth silt loam; contains a moderate amount of organic matter.

B_1 5 to 19 inches, moderate yellowish-brown, compact, tight silty clay loam to silty clay; breaks easily into weak blocky structure.

B_2 19 to 54 inches, light yellowish-brown silty clay loam to silty clay; moderately compact but friable; some brown and gray mottlings in the lower part.

C 54 inches +, mottled pale-yellow, brown, and gray silty clay; contains numerous small mica flakes.

Captina series

The Captina soils are alluvial in origin and are predominantly from limestone materials. Some shale and sandstone materials are included in places. The soils, mapped with the Capshaw as undifferentiated units, occupy moderately low stream terraces and broad old alluvial fans in the limestone valleys. They are closely associated with Etowah, Taft, Wolftever, and Tupelo soils. They resemble the Capshaw soils in many respects but have a more compact layer at 24 to 30 inches. They are somewhat lighter in color than Etowah. The relief is nearly level to undulating. They are imperfectly drained and strongly acid.

Fairly representative profile of Captina silt loam:

A_1 0 to 5 inches, yellowish-brown friable silt loam; contains some organic matter.
A_2 and B_1 5 to 18 inches, brownish-yellow friable silty clay loam; contains some dark-brown stains and concretions.
B_2 18 to 30 inches, yellow, mottled with gray, slightly plastic silty clay loam.
B_3 30 to 60 inches, yellowish-brown compact silty clay; light gray along crevices and cracks and dark-brown coatings on concretions.
C 60 inches +, mottled gray, yellow, and brown partially weathered alluvium of sand, silt, and clay; beds of gravel in places.

Taft series

The Taft soil occupies low, level terraces in the limestone valleys. Its parent material has been washed chiefly from soils underlain by limestone similar to that giving rise to the Wolftever, Captina, Capshaw, and Etowah soils. Internal drainage is slower than for either Wolftever or Etowah soils. The surface layer is grayer and the upper part of the illuviated layer is less compact than that of the Wolftever soil. However, there is a compact, slowly pervious layer in the lower part of the B horizon of this soil. The soil is strongly to very strongly acid throughout.

Profile description of Taft silt loam:

A_1 0 to 4 inches, light brownish-gray friable silt loam; contains some organic matter.
A_2 4 to 9 inches, brownish-gray friable silt loam; moderately low in organic matter.
B_1 9 to 25 inches, light yellowish-brown silty clay loam; moderately compact but friable; contains some mottlings of gray and brown in the lower part.
B_2 25 to 36 inches, mottled brown, gray, and weak yellow very compact silty clay; breaks into blocky aggregates.
C 36 inches +, gray, moderate yellow, and brown very compact silty clay; gray color increases with depth and the material becomes more friable.

Tupelo series

The soil of the Tupelo series occupies nearly level or slightly depressional positions on low terraces and, like the Taft and Capshaw soils, its parent material has been washed chiefly from soils overlying limestone. Internal drainage is slower than in either of those soils, however, and the B horizon is tougher and more compact than that of the Taft series. The Tupelo soil is strongly acid throughout.

Profile description of Tupelo silt loam:

A_1 0 to 2 inches, light brownish-gray friable silt loam; contains a moderate amount of organic matter.
A_2 2 to 7 inches, weak-yellow friable heavy silt loam; contains numerous rust-brown concretions.
B_1 7 to 14 inches, light yellowish-brown silty clay splotched with rust brown and gray; crushes into irregular or nut structure.
B_2 14 to 33 inches, light yellowish-brown heavy plastic clay mottled with gray, yellow, and rust brown.
C 33 inches +, light brownish-gray heavy sticky plastic clay mottled with gray, pale yellow, and dark rust brown.

Monongahela series

The Monongahela soil occupies nearly level or very gently sloping positions on low terraces in the limestone valleys. Its parent material has been washed chiefly from soil underlain by sandstone and acid shale. Internal drainage is slower than for the Sequatchie or Holston soils, with which it is associated, and the surface layer is

grayer and the B horizon more compact. This soil is strongly acid throughout its entire depth.

Representative profile of Monongahela fine sandy loam:

A_1 0 to 2 inches, light brownish-gray loose fine sandy loam; contains some organic matter and many small roots.

A_2 2 to 15 inches, weak-yellow friable fine sandy loam; contains some splotching of gray and rust brown in the lower part.

B_1 15 to 24 inches, light yellowish-brown compact fine sandy clay loam mottled with gray, pale yellow, and rust brown; contains some rust-brown concretions.

B_2 24 to 36 inches, light-gray very compact sandy clay loam, mottled with rust brown and light yellowish brown; contains numerous rust-brown concretions.

C 36 inches +, mottled moderate yellowish-brown, gray, and pale yellow, very compact silty clay; contains numerous rust-brown concretions.

Robertsville series

The Robertsville soil occupies level or slightly depressional positions on low terraces consisting chiefly of materials washed from soils underlain by limestone. It has very slow internal drainage and may be considered the poorest drained member of a catena comprised of the Cumberland, Etowah, Capshaw, Taft, and Robertsville series. The surface layer is highly leached, and the subsoil is mottled and grayer than those of the soils of the other four series. The Robertsville soil is medium to strongly acid throughout.

Representative profile of virgin Robertsville silt loam:

0 to 6 inches, brownish-gray to light brownish-gray smooth friable silt loam; contains some organic matter in the upper part.

6 to 12 inches, light gray to medium-gray heavy silty clay loam mottled with brownish yellow and whitish gray.

12 to 45 inches, medium-gray heavy plastic clay mottled with rust yellow and brown.

Tyler series

The Tyler soils have nearly level or slightly depressional positions on moderately old terraces. They have developed from old alluvium, chiefly material washed from soils underlain by sandstone and shale. They have very slow internal drainage and are the most poorly drained members of a catena consisting of the Waynesboro, Sequatchie, Holston-Monongahela, and Tyler series. The soils are very strongly acid.

A typical profile of Tyler silt loam:

0 to 10 inches, medium-gray to whitish-gray smooth silt loam; contains some organic matter in the top inch.

10 to 22 inches, light-gray heavy silty clay loam to silty clay mottled with rust brown and yellow.

22 to 45 inches, light-gray to whitish-gray compact silty clay mottled with yellow and rusty brown; moderately plastic when wet.

Lickdale series

Lickdale soil, as mapped in most places in Morgan County, is the very poorly drained associate of the Barbourville and Cotaco soils. Some areas have developed in place over interbedded sandstone and shale, but most are from colluvium and local alluvium derived from sandstone and shale. Although the two associates manifest little profile development, the Lickdale soil displays a profile that is properly classified as intrazonal. Its profile resembles that of the Tyler series. It is predominantly gray, relatively heavy below a depth of 15 or 18 inches, very strongly acid, and very poorly drained.

Representative profile of Lickdale silt loam:

0 to 7 inches, light brownish-gray to yellowish-gray friable silt loam; relatively high content of organic matter in the upper inch.
7 to 15 inches, light-gray to whitish-gray silt loam splotched with weak yellow; slightly compact but friable.
15 to 23 inches, light olive-gray, splotched with dusky yellow and light gray, silty clay loam; compact but moderately friable.
23 inches +, moderate olive-brown to light-brown, gray, and yellow compact heavy silty clay to clay.

RENDZINA SOILS

Rendzina soils (7) are an intrazonal group of soils that usually have brown or black friable surface horizons underlain by light-gray or yellowish calcareous materials; they have developed under grass vegetation, or mixed grass and forest, in humid and semiarid regions from relatively soft, highly calcareous parent materials. They have formed under conditions such that there is an excess of water a part of the time. Organic matter accumulates in the surface layer because aeration is poor and organic matter does not decay so rapidly as it does in the better drained soils.

Soils of the Hollywood series are the only Rendzina soils mapped in Morgan County.

Hollywood series

The Hollywood soils have developed on material washed from soils underlain by limestone. They are characterized by a dark surface layer and a gray plastic clay subsoil. The soils are slightly acid to mildly alkaline in all layers. Soils of the Hollywood series are imperfectly drained, but not so poorly drained as Half Bog soils. It is thought that the organic matter has been preserved more by the relatively high calcium concentration than by impaired oxidation.

Representative profile of Hollywood silty clay:

0 to 12 inches, dusky olive to olive-black heavy plastic silty clay; crushes to a granular mass.
12 to 28 inches, medium olive-brown to light olive-gray clay; heavy, tough, and plastic; very massive when wet but crushes into a blocky structure when dry.
28 to 36 inches, dusky yellow to light olive-gray clay, mottled with rust brown and weak yellow; heavy and tough; contains some small irregular-shaped concretions.
36 inches +, light olive-gray to dusky yellow clay mottled with rust brown and gray; heavy and tough; contains numerous lime nodules ¼ to 1½ inches in diameter.

LITHOSOLS

Lithosols are an azonal group of soils having no clearly expressed soil morphology. They consist of a freshly and imperfectly weathered mass of rock fragments and are largely confined to steeply sloping land. They have developed under conditions of ample to excessive moisture. Much of the area is covered with timber.

Pottsville series

Soils of the Pottsville series occupy hilly to steep slopes and consist of residuum from thinly interbedded sandstone and acid shale of the Pottsville formation. The soil material is variable in thickness. Sandstone boulders and smaller sandstone fragments are numerous on many of the Pottsville soils. Pottsville soils differ from the Enders

soils chiefly in profile development, slope, and stoniness, and from the Muskingum soils in source of parent material.

Typical profile of a Pottsville shaly silt loam:

0 to 6 inches, brownish-gray to yellowish-brown friable loam; contains varying sizes of sandstone fragments.
6 to 21 inches, moderate yellowish-brown to light brownish-gray clay mottled with gray, yellow, and brown.
21 inches +, partially weathered very thin interbedded shale and sandstone clay; shale is gray and sandstone is brown.

Hector series

Soils of the Hector series have developed from sandstone and acid shale on hilly to steep slopes. They differ from soils of the Muskingum series chiefly in having a brownish-red rather than a yellow subsoil. The Hector soils are a brownish-gray fine sandy loam to depths of 6 to 10 inches, and the underlying material is reddish-brown light fine sandy clay 12 to 18 inches thick. This layer is underlain by partially weathered sandstone.

Muskingum series

The soils of the Muskingum series occupy hilly to steep slopes and have developed from sandstone and acid shale. They have a paler colored profile than the Hector soils. Internal drainage is rapid to excessive. The Muskingum soils consist of brownish-gray to yellowish-brown loose fine sandy loam, 10 to 20 inches thick, underlain by partially weathered sandstone fragments. In many places the underlying material is sandstone bedrock.

ALLUVIAL SOILS

Alluvial soils are an azonal group of soils developed from transported and relatively recently deposited material (alluvium); they are characterized by a weak modification, or none, of the original material by soil-forming processes. In Morgan County these soils are on first bottoms along the streams and in depressions, or sinks, in the uplands. They have nearly level to depressional relief and very rapid to very slow internal drainage. Their main characteristic in common is the lack of a soil profile consisting of genetically related horizons. The properties of the soil strongly reflect the character of the alluvial deposit. The Huntington, Lindside, Egam, Pope, Bruno, and Philo soils occupy first bottoms. Abernathy, Ooltewah, Barbourville, and Cotaco soils occur in depressional upland positions.

Alluvial soils derived from similar parent material may differ in the condition of drainage, and some differences among the soils exist because of these drainage variations. Alluvial soils derived from similar parent material but differing in drainage have been differentiated mainly on the basis of properties associated with good, imperfect, or poor drainage. Collectively, the soils with these three degrees of drainage constitute a soil catena. In order to bring out the relations among the Alluvial soils of Morgan County, they are discussed in relation to their catenary positions and to their soil materials.

Huntington and Lindside series

The well-drained Huntington and the imperfectly drained Lindside soils, with the poorly drained Melvin soils, form a catena of soils derived from general alluvium made up chiefly of limestone.

The Huntington soils are yellowish brown or brown to depths of 36 to 60 inches, the Lindside soil is brown or brownish gray to a depth of 12 to 20 inches, below which it is mottled light gray, yellow, and brown.

The texture of Huntington and Lindside soils does not differ widely, although a few areas of the sanded phase of Huntington fine sandy loam are mapped in Morgan County. In greater part, the Huntington soils have a uniform silt loam surface layer and underlying material of silty clay loam. The surface layer of the Lindside soil is uniformly silty clay loam, and the underlying material is silty clay loam or silty clay. Soils of these two series range from medium acid to slightly acid.

Melvin series

The Melvin soil is on first bottoms and was derived from limestone materials. It is light in color and is the poorly drained member of the Huntington-Lindside-Melvin catena. Melvin soil is subject to periodic flooding, and its subsoil is wet most of the time. However, the surface layer became sufficiently drained to favor oxidation of the organic matter. Because of its more recent deposition, the Melvin soil has developed more variable profile characteristics than the Robertsville soil. They are medium to slightly acid throughout.

A typical profile of Melvin silt loam:

0 to 2 inches, brownish-gray friable silt loam; moderately high in organic matter.
2 to 8 inches, light brownish-gray friable silty clay loam; splotched with gray and rust brown.
8 to 40 inches, medium-gray, mottled with rust brown, heavy, sticky moderately compact clay.
40 inches +, light-gray and bluish-gray heavy sticky plastic clay.

Egam series

The Egam soil is closely related to the Huntington soils and was derived from similar kinds of material. At a depth of 15 to 24 inches, however, the Egam soil is characterized by a heavier texture and more compact layer than the corresponding layer in the Huntington soils. The Egam soil may be older morphologically, or it may be the result of particular periods in which coarse and fine materials were deposited. In many places the compact layer is dark, which suggests that an old surface layer has been buried under more recent alluvium. The upper 12 to 15 inches is generally a brownish-gray silt loam or silty clay loam. It is underlain by a weak-brown compact silty clay about 10 to 12 inches thick. The underlying material is a brownish-gray silty clay or clay, mottled with gray and brown; it is strongly plastic when wet but hard and brittle when dry. The soil is slightly acid in all layers.

The Egam soil is subject to flooding and commonly receives new deposits of alluvial material. The heavy layer therefore is not entirely the result of eluviation from layers above it, and consequently the Egam soil has been placed in the Alluvial great soil group.

Dunning series

The Dunning soil consists of heavy-textured alluvium washed from soils underlain by limestone. It differs from the Hollywood soils in being on first bottoms rather than on colluvial slopes and is less well

drained. It is subject to flooding. The Dunning soil has a finer texture than the Melvin soil and a darker colored surface layer. The soil is mildly alkaline in the upper part of the profile and medium to slightly acid in the lower part.

Representative profile of Dunning silty clay:

0 to 3 inches, dark olive-brown silty clay; friable when moderately dry but very sticky when wet; relatively high in organic matter.
3 to 14 inches, medium olive-gray, mottled with olive brown, heavy plastic clay.
14 to 36 inches, weak-olive to light olive-gray heavy plastic sticky clay mottled with rust brown and bluish gray.
36 inches +, olive-gray, heavy, sticky, plastic clay mottled with gray, pale yellow, and rust brown.

Pope and Philo series

The Pope and Philo soils, with the Atkins soil, form a catena of soils derived from general alluvium made up mainly of sandstone and acid shale. The Pope soil is well drained; the Philo, imperfectly drained; and the Atkins, poorly drained. The Pope and Philo soils are strongly acid to medium acid in reaction.

The Pope soil is brownish gray to brown to depths of 36 to 48 inches, below which it is mottled gray, pale yellow, and brown. The Philo soil is yellowish brown to depths of 12 to 20 inches, below which it is mottled gray, pale yellow, and brown. The textures of Pope and Philo soils do not vary greatly. The surface layers are uniformly fine sandy loam, and the underlying material is very fine sandy loam to loam.

Atkins series

The soil of the Atkins series is on first bottoms and consists of material derived from sandstone and acid shale. It is the most poorly drained member of the Pope-Philo-Atkins catena and is characterized by a gray surface layer and predominantly gray subsoil. Atkins soil is subject to frequent flooding and its subsoil remains wet most of the time. The profile characteristics are generally more variable than are those of the Tyler soils because the deposited material has been in place for a comparatively short time.

Representative profile of the Atkins silt loam:

0 to 9 inches, brownish-gray smooth silt loam mottled or splotched with gray and rust brown; contains some organic matter.
9 to 35 inches, medium-gray silty clay loam mottled with rust brown and whitish gray; crushes to a weak nut structure.
35 inches +, light olive-gray silty clay loam mottled with gray and rust brown; slightly compact but friable.

Bruno series

The soil of the Bruno series is closely related to the Pope soil. Both are derived from similar kinds of material and their profiles are characterized by loose loamy fine sand. The larger areas of Bruno soil occur along the Tennessee River. Bruno soil, as mapped in Morgan County, is brown to brownish gray, loose incoherent loamy fine sand, ranging from 3 to 5 feet thick. It is slightly acid throughout.

Abernathy and Ooltewah series

The soils of the Abernathy and Ooltewah series are, respectively, the well-drained and imperfectly drained members of a catena of soils

derived from colluvium and alluvium washed chiefly from soils underlain by limestone. The Abernathy is somewhat comparable with the Huntington soils, and the Ooltewah with the Lindside. The Abernathy and Ooltewah soils, however, are derived from local rather than general colluvium and alluvium. Most of the drainage is internal through cracks and crevices in the underlying limestone bedrock. Drainage is moderate in the Abernathy soils but slow in the Ooltewah. External drainage is slow for both series.

Abernathy silt loam is a comparatively young soil. It is a brown to reddish-brown mellow silt loam to depths of 24 inches or more. Below this depth the material is generally yellowish-brown silty clay loam to silty clay mottled with gray, yellow, and brown.

Ooltewah silt loam is a generally moderate brown to weak reddish-brown silt loam ranging to depths of 10 to 18 inches, but below this depth it is a brownish-gray silt loam to silty clay loam, mottled with gray and rust brown. The soils of these two series are strongly acid.

Barbourville and Cotaco series

The Barbourville and Cotaco soils, with the Lickdale soil previously described, make up a catena of soils consisting of general colluvium and alluvium derived mainly from sandstone and acid shale.

The Barbourville soil is well drained; the Cotaco, imperfectly drained; and the Lickdale, poorly drained. Barbourville and Cotaco soils occupy depressional positions in the sandstone plateaus and are strongly to very strongly acid.

The Barbourville soil is light yellowish-brown fine sandy loam to silt loam to depths of 30 to 48 inches or more. The Cotaco soil is generally yellowish-brown loam to silt loam to depths of 12 to 20 inches.

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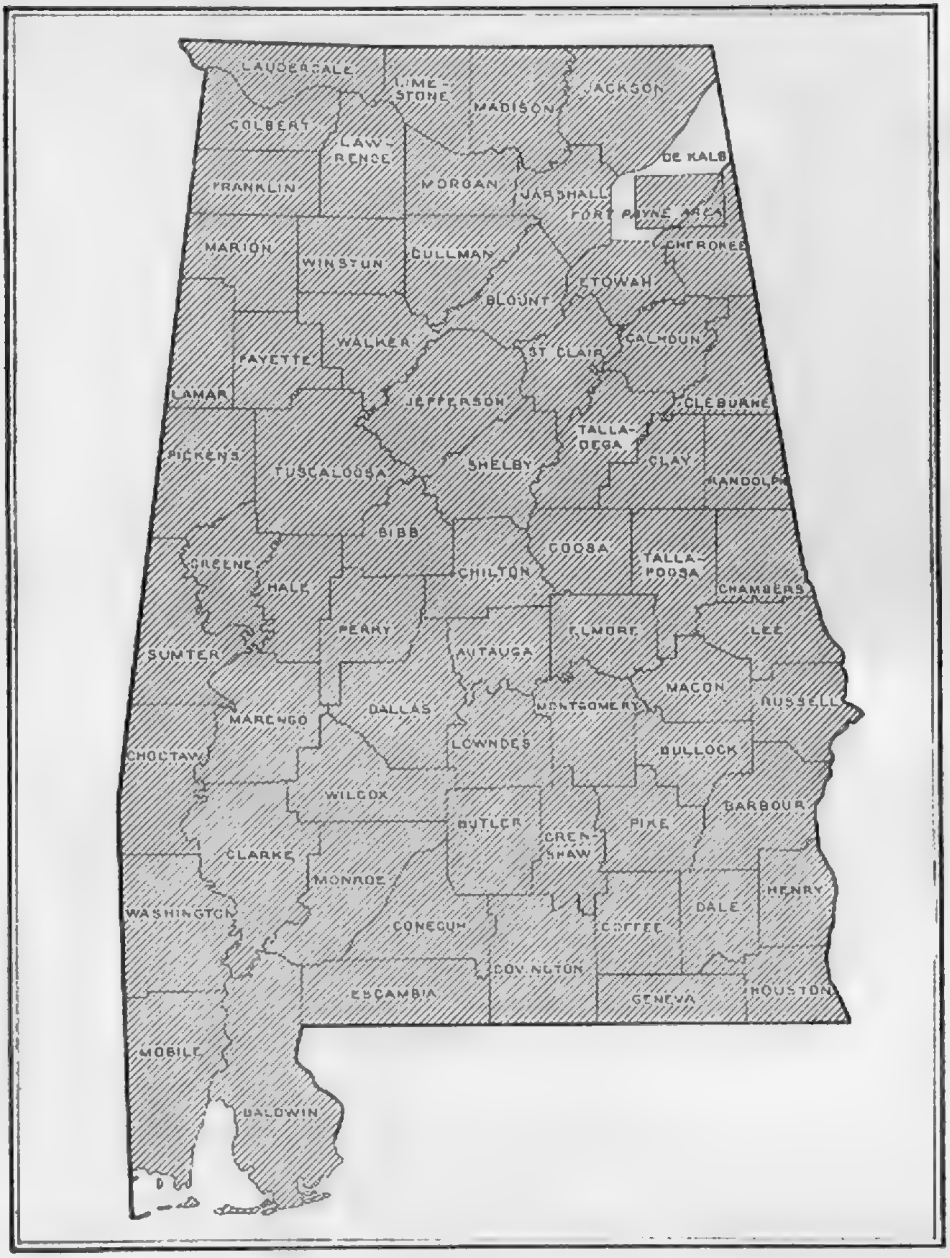

Areas surveyed in Alabama shown by shading.

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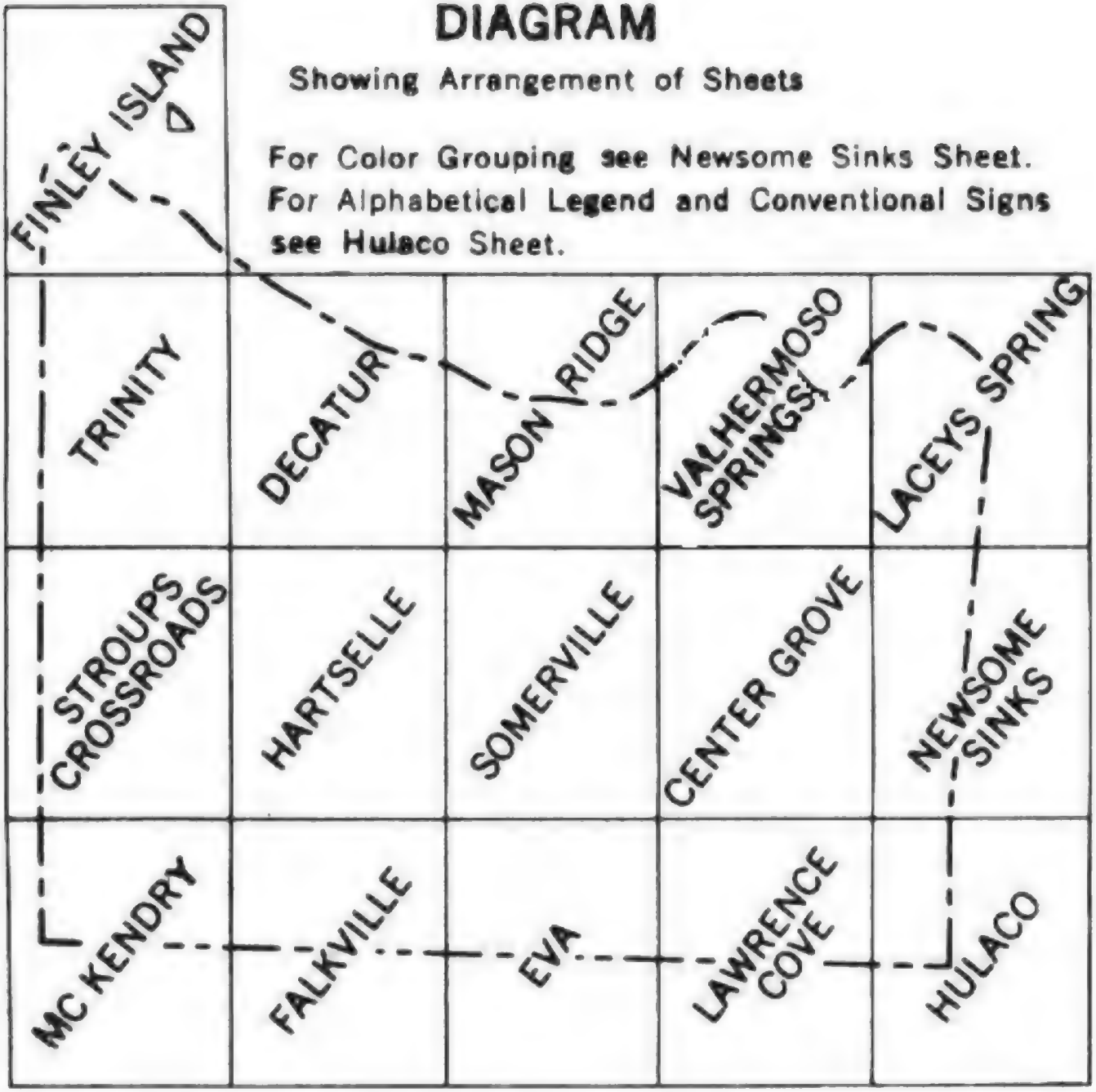
DIAGRAM

Showing Arrangement of Sheets

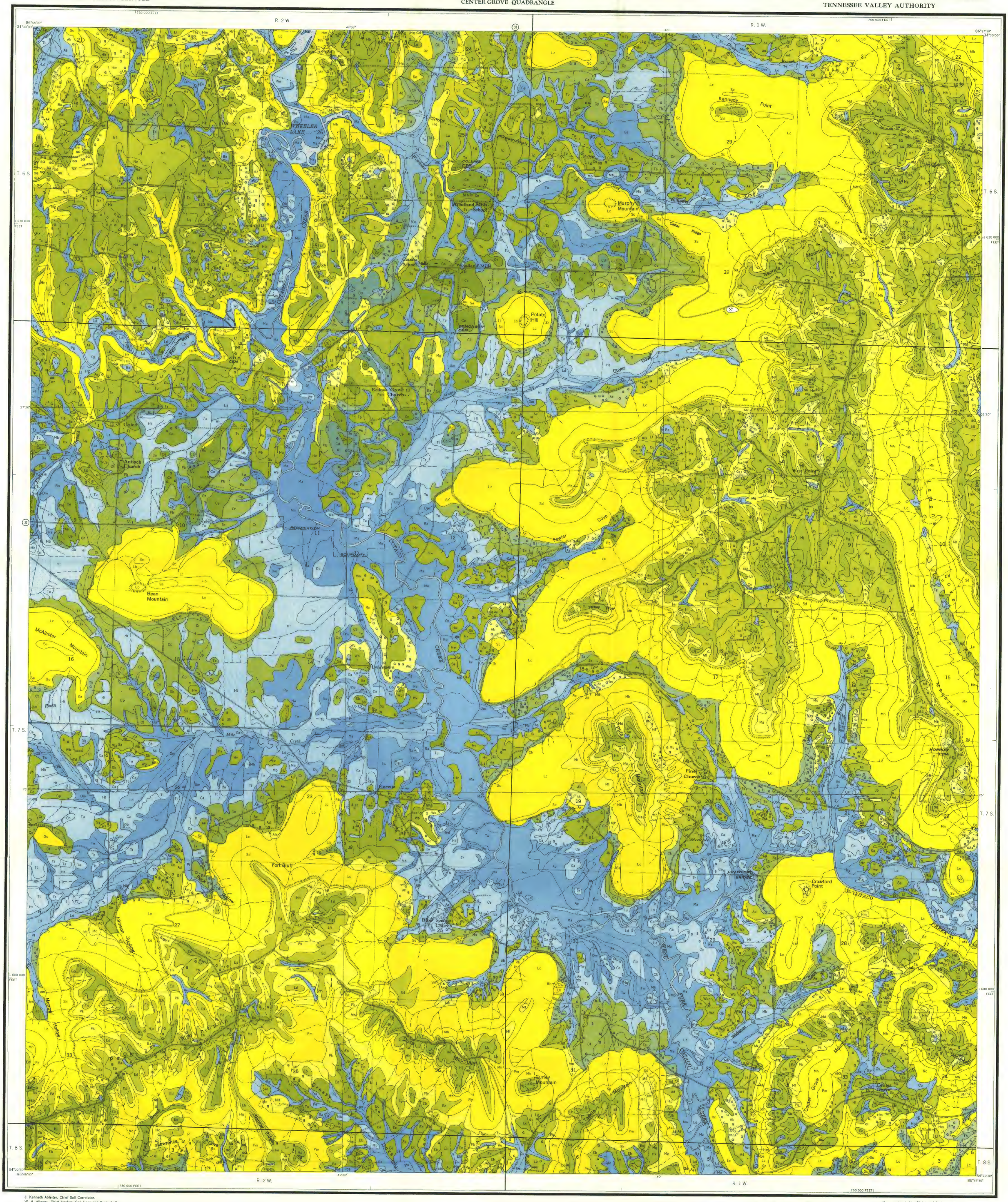
For Color Grouping see Newsome Sinks Sheet.
For Alphabetical Legend and Conventional Signs see Hulaco Sheet.



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY—ALABAMA
CENTER GROVE QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY



J. Kenneth Ableiter, Chief Soil Correlator.
W. H. Allaway, Chief Analyst, Soil Uses and Productivity.
Roy W. Simonson, Principal Soil Correlator, Southern States.
Area inspected by J. W. Moon, Senior Soil Scientist, Southern States.
Soils surveyed 1941-44 by Hoyt Sherard, in Charge, C. L. McIntyre, H. J. Wesson, and R. S. Farnham, Alabama Department of Agriculture and Industries, and G. A. Swenson, A. H. Hasty, and Robert Wildermuth, U. S. Department of Agriculture.

1 ½ 0 1 2 Miles
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DIAGRAM
Showing Arrangement of Sheets
For Color Grouping see Newsome Sinks Sheet.
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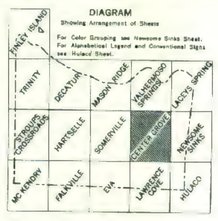

Map constructed by Division of Cartography, Soil Conservation Service, USDA, from TVA topographic and planimetric quadrangles. Soils surveyed on 1937 aerial photographs. Polyconic projection, 1927 North American datum. 10000-foot grid based on Alabama (West) rectangular coordinate system.

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PRINCIPAL CHARACTERISTICS OF THE SOILS OF MORGAN COUNTY, ALA.

Map symbol	Soil	Management group [1]	Parent material	Dominant slope range	Internal drainage	Color of surface soil [2]	Subsoil or substratum		Depth of profile [4]
							Color	Consistence [3]	
				Percent					*feet*
Ab	Abernathy silt loam	1	Local colluvium and alluvium from uplands underlain by limestone.	0–2	Moderate [5]	Brown to reddish brown	Moderate brown to dark brown	Moderately friable	2–8
Aa	Abernathy fine sandy loam	1	Local colluvium and alluvium from uplands underlain by limestone and sandstone.	0–2	Moderate	Grayish brown to reddish brown	Same	Moderately friable	2–8
Al	Allen fine sandy loam, undulating phase	14	Old colluvium from sandstone and shale	2–6	Moderate	Brownish gray	Reddish brown	Friable	4–10
Ae	Allen fine sandy loam, eroded undulating phase	14	Same	2–6	Moderate	Grayish brown	Reddish brown	Friable	4–10
Ao	Allen fine sandy loam, rolling phase	15	Same	6–12	Moderate to rapid	Brownish gray	Reddish brown	Friable	4–8
Ad	Allen fine sandy loam, eroded rolling phase	15	Same	6–12	Moderate to rapid	Pale reddish brown	Reddish brown	Friable	4–8
Ak	Allen fine sandy loam, severely eroded rolling phase	18	Same	6–12	Moderate to rapid	Red to reddish brown	Yellowish red to brownish red	Friable	4–8
Ap	Allen fine sandy loam, hilly phase	16	Same	12–20	Moderate to rapid	Brownish gray	Same	Friable	4–6
Ac	Allen fine sandy loam, eroded hilly phase	16	Same	12–20	Moderate to rapid	Reddish brown	Same	Friable	4–6
Ah	Allen fine sandy loam, severely eroded hilly phase	16	Same	12–20	Moderate to rapid	Reddish brown	Same	Friable	4–6
Am	Allen stony fine sandy loam, eroded rolling phase	17	Same	6–12	Moderate to rapid	Pale reddish brown	Same	Friable	3–5
An	Allen stony fine sandy loam, hilly phase	17	Same	12–20	Moderate	Brownish gray	Same	Friable	3–5
Ao	Atkins silt loam	5	Alluvium from uplands underlain by sandstone and shale.	0–2	Very slow	Brownish gray mottled with gray and brown.	Medium gray mottled with rust brown and gray.	Plastic and sticky when wet.	4–8
Ba	Barbourville fine sandy loam	2	Local colluvium and alluvium from soils underlain by sandstone and shale.	0–6	Moderate	Yellowish brown	Light yellowish brown to moderate yellowish brown.	Friable	6–10
Bn	Bruno loamy fine sand	2	Alluvium from uplands underlain by sandstone, shale, and limestone.	0–6	Rapid to excessive	Light brownish gray	Brownish gray; yellowish brown in lower part.	Loose	6–10
Cb	Captina and Capshaw silt loams, undifferentiated	3	Old alluvium from uplands underlain by limestone, with some shale in places.	2–6	Moderate to slow	Brownish gray	Yellowish brown	Firm to friable	6–10
Ca	Captina and Capshaw loams, undifferentiated	3	Same	2–6	Moderate to slow	Brownish gray	Yellowish brown	Firm to friable	6–10
Cf	Christian loam, undulating phase	7	Residuum from weathered interbedded sandstone, shale, and limestone.	2–6	Moderate	Brownish to reddish brown	Reddish brown	Firm	4–8
Ce	Christian loam, eroded undulating phase	7	Same	2–6	Moderate	Same	Reddish brown	Firm	4–8
Cd	Christian loam, eroded rolling phase	8	Same	6–12	Moderate	Same	Reddish brown	Firm	4–8
Cc	Christian clay loam, severely eroded rolling phase	9	Same	6–12	Moderate	Brownish gray to pale reddish brown	Reddish brown	Firm	3–6
Co	Cobbly colluvium (Jefferson soil material)	20	Colluvium from uplands underlain by sandstone	0–6	Rapid to excessive	Grayish brown	Grayish brown	Very friable	0–12
Cf	Colbert silt loam, level phase	11	Residuum from weathered clayey limestone	0–2	Moderately slow to very slow.	Brownish gray to yellowish brown	Yellowish brown mottled with gray and brown.	Very strongly plastic	2–6
Cn	Colbert silt loam, undulating phase	11	Same	2–6	Same	Same	Same	Very strongly plastic	2–6
Co	Colbert loam, undulating phase	11	Residuum from weathered clayey limestone, with some sandstone.	2–6	Same	Brownish gray	Same	Very strongly plastic	2–6
Cl	Colbert loam, eroded undulating phase	11	Same	2–6	Same	Brownish gray	Same	Very strongly plastic	2–6
Cn	Colbert loam, rolling phase	10	Same	6–12	Same	Brownish gray	Same	Very strongly plastic	2–6
Ck	Colbert loam, eroded rolling phase	10	Same	6–12	Same	Yellowish gray	Same	Very strongly plastic	2–6
Cm	Colbert loam, hilly phase	13	Same	12–20	Same	Brownish gray	Same	Very strongly plastic	2–6
Ct	Colbert silty clay loam, eroded undulating phase	12	Residuum from weathered clayey limestone	2–6	Same	Olive brown to yellowish brown	Same	Very strongly plastic	2–6
Cs	Colbert silty clay loam, eroded rolling phase	10	Same	6–12	Same	Same	Same	Very strongly plastic	2–6
Ch	Colbert cherty silt loam, rolling phase	10	Same	6–12	Same	Brownish gray	Same	Very strongly plastic	2–6
Cu	Cotaco loam	2	Recent local alluvium and colluvium from soils underlain by sandstone and shale.	2–4	Moderately slow	Brownish gray to yellowish brown	Yellowish brown mottled with light gray and brown.	Friable	3–10
Cv	Crossville loam, undulating phase	14	Residuum from weathered sandstone and some shale	2–5	Moderate	Brownish gray	Reddish brown	Friable	2–6
Cw	Cumberland silt loam, level phase	7	General alluvium derived mainly from land underlain by limestone.	0–2	Moderate	Brownish gray to yellowish brown	Moderate yellowish brown to moderate reddish brown.	Friable	4–12
Cx	Cumberland silt loam, undulating phase	7	Same	2–6	Moderate	Same	Same	Friable	4–12
Cr	Cumberland silty clay loam, eroded undulating phase	7	Same	2–6	Moderate	Reddish brown to moderate red	Same	Friable	4–12
Cz	Cumberland silty clay loam, severely eroded rolling phase	9	Same	6–12	Moderate	Same	Same	Friable	4–12
Da	Decatur silt loam, undulating phase	7	Residuum from weathered high-grade limestone	2–6	Moderate	Reddish brown to brown	Moderate reddish brown	Friable	4–12
Db	Decatur silty clay loam, eroded undulating phase	7	Same	2–6	Moderate	Reddish brown	Moderate reddish brown	Friable	4–12
Dc	Decatur silty clay loam, severely eroded rolling phase	9	Same	6–12	Moderate	Reddish brown to red	Moderate reddish brown	Friable	4–12
Dg	Dewey silt loam, undulating phase	7	Same	2–6	Moderate	Brown	Strong brown to reddish brown	Friable	4–12
Dl	Dewey silty clay loam, eroded undulating phase	7	Same	2–6	Moderate	Reddish brown	Same	Friable	4–12
De	Dewey silty clay loam, eroded rolling phase	8	Same	6–12	Moderate	Reddish brown	Same	Friable	4–12
Dh	Dewey silty clay loam, eroded hilly phase	13	Same	12–20	Moderate	Reddish brown	Same	Friable	4–12
Dd	Dewey cherty silt loam, undulating phase	7	Same	2–6	Moderate	Grayish brown to weak brown	Same	Friable	4–10
Dr	Dewey cherty silty clay loam, eroded undulating phase	7	Same	2–6	Moderate	Reddish brown	Same	Friable	4–10
Dz	Dewey cherty silty clay loam, eroded rolling phase	8	Same	6–12	Moderate	Reddish brown	Same	Friable	4–10
Dm	Dunning silty clay	6	Alluvium from uplands underlain by limestone	0–2	Very slow	Dark olive brown	Weak olive gray mottled with rust brown and bluish gray.	Very strongly plastic	6–12
Ea	Egam silty clay loam	1	Same	0–2	Moderately slow	Brownish gray	Weak brown	Plastic and sticky when wet.	8–12
Ee	Enders loam, undulating phase	14	Residuum weathered from shale and sandstone	2–5	Slow	Light brownish gray	Moderate yellowish brown; mottled in lower part.	Friable to firm	4–8
Ec	Enders loam, eroded undulating phase	14	Same	2–5	Medium; slow in lower part of subsoil.	Grayish yellow	Same	Friable to firm	4–8
Eo	Enders loam, rolling phase	15	Same	5–10	Same	Light brownish gray	Same	Friable to firm	4–8
Es	Enders loam, eroded rolling phase	15	Same	5–10	Same	Grayish yellow	Brown to yellowish brown	Friable to firm	4–8
Ev	Etowah loam, level phase	7	General alluvium derived mainly from land underlain by limestone.	0–2	Moderate	Grayish brown	Yellowish brown to brown	Friable to firm	6–12
Eu	Etowah loam, undulating phase	7	Same	2–6	Moderate	Grayish brown	Moderate to strong brown	Friable to firm	6–12
En	Etowah silty clay loam, eroded undulating phase	7	Same	2–6	Moderate	Brown to reddish brown	Same	Friable to firm	6–12
Ga	Guthrie silt loam	5	Colluvium and local alluvium derived from limestone	0–2	Very slow	Light gray or medium gray	Yellowish gray mottled with light gray and weak yellow.	Firm to very firm	4–8
Hc	Hanceville fine sandy loam, undulating phase	14	Residuum weathered from interbedded sandstone and shale.	2–5	Moderate	Light grayish brown to moderate yellowish brown.	Weak to moderate reddish brown	Friable	3–6
Hh	Hanceville fine sandy loam, eroded undulating phase	14	Same	2–5	Moderate	Yellowish to reddish brown	Same	Friable	3–6
Ha	Hanceville fine sandy loam, eroded rolling phase	15	Same	5–10	Moderate	Reddish brown	Same	Friable	3–6
Hd	Hanceville loam, severely eroded rolling phase	18	Same	5–10	Moderate	Red to reddish brown	Same	Friable	3–6
Hf	Hartsells fine sandy loam, undulating phase	14	Residuum weathered from sandstone and small amounts of shale.	2–5	Moderate	Brownish gray to yellowish brown	Moderate to light yellowish brown	Friable	4–8
Hg	Hartsells fine sandy loam, eroded undulating phase	14	Same	2–5	Moderate	Yellowish brown	Same	Friable	4–8
Hh	Hartsells fine sandy loam, rolling phase	15	Same	5–10	Moderate	Brownish gray to yellowish brown	Same	Friable	4–8
He	Hartsells fine sandy loam, eroded rolling phase	15	Same	5–10	Moderate	Yellowish brown	Same	Friable	4–8
Hk	Hartsells fine sandy loam, undulating shallow phase	14	Same	2–5	Moderate	Brownish gray to yellowish brown	Same	Friable	1–2½
Hl	Hartsells fine sandy loam, rolling shallow phase	15	Same	5–10	Moderate	Same	Same	Friable	1–2½
Hp	Hartsells fine sandy loam, eroded rolling shallow phase	15	Same	5–10	Moderate	Yellowish brown	Same	Friable	1–2½
Hl	Hartsells loam, undulating phase	14	Same	2–5	Moderate	Yellowish gray	Weak yellow to moderate yellowish brown.	Friable	3–6
Hn	Hector fine sandy loam, hilly phase	16	Residuum weathered from interbedded sandstone and shale.	10–20	Rapid	Brownish gray	Reddish brown	Friable	1–3
Hm	Hector fine sandy loam, eroded hilly phase	16	Same	10–20	Rapid	Reddish brown	Reddish brown	Friable	1–3
Ho	Hector fine sandy loam, severely eroded hilly phase	16	Same	10–20	Rapid	Red to reddish brown	Reddish brown	Friable	1–3
Hq	Hector stony fine sandy loam, hilly phase	17	Same	10–20	Rapid	Grayish brown	Brown to reddish brown	Friable	1–3
Hp	Hector stony fine sandy loam, eroded hilly phase	17	Same	10–20	Rapid	Brown to reddish brown	Reddish brown to red	Friable	1–3
Hr	Hector stony fine sandy loam, steep phase	19	Same	20+	Rapid	Grayish brown	Brown to reddish brown	Friable	1–2½
Ht	Hollywood silty clay	4	Colluvium and local alluvium derived from limestone	0–6	Slow	Dusky olive to black	Medium olive gray to light olive gray	Very strongly plastic	2–4
Hs	Hollywood loam	4	Same	0–2	Slow	Dark grayish brown	Olive black	Very strongly plastic	2–4
Hv	Holston fine sandy loam, level phase	14	Alluvium from uplands underlain mainly by sandstone and shale.	0–2	Moderately slow to moderate.	Brownish gray to grayish yellow	Yellow to bright yellow	Friable	6–12
Hw	Holston fine sandy loam, undulating phase	14	Same	2–6	Moderate	Same	Yellow to bright yellow	Friable	6–12
Hu	Holston fine sandy loam, eroded undulating phase	14	Same	2–6	Moderate	Light brownish gray to yellowish gray.	Yellow to bright yellow	Friable	6–12
HA	Holston gravelly fine sandy loam, undulating phase	14	Same	2–6	Moderate	Gray to brownish gray	Yellow to light yellowish brown	Friable	6–12
Hy	Holston gravelly fine sandy loam, eroded undulating phase.	14	Same	2–6	Moderate	Yellowish gray	Same	Friable	6–12

PRINCIPAL CHARACTERISTICS OF THE SOILS OF MORGAN COUNTY, ALA.—Continued

Map symbol	Soil	Management group [1]	Parent material	Dominant slope range	Internal drainage	Color of surface soil [2]	Subsoil or substratum		Depth of profile [4]
							Color	Consistence [3]	
				Percent					*feet*
Hz	Holston gravelly fine sandy loam, rolling phase	15	Same	6–12	Moderate	Brownish gray to grayish yellow	Same	Friable	6–12
Hx	Holston gravelly fine sandy loam, eroded rolling phase	15	Same	6–12	Moderate	Light brownish gray to yellowish gray.	Same	Friable	6–12
Hc	Huntington silt loam	1	Alluvium from uplands underlain mainly by limestone.	0–2	Moderate	Brown	Grayish brown	Friable	6–12
Hb	Huntington fine sandy loam, sanded phase	1	Alluvium from uplands underlain by limestone, shale, and sandstone.	0–2	Moderate	Brown	Grayish brown	Friable	6–12
Jo	Jefferson fine sandy loam, undulating phase	14	Old colluvium from uplands underlain mainly by sandstone and shale.	2–6	Moderate	Brownish gray	Light yellowish brown	Friable	4–10
Js	Jefferson fine sandy loam, eroded undulating phase	14	Same	2–6	Moderate	Yellowish gray	Light yellowish brown	Friable	4–10
Jc	Jefferson fine sandy loam, rolling phase	15	Same	6–12	Moderate	Brownish gray	Light yellowish brown	Friable	4–10
Ja	Jefferson fine sandy loam, eroded rolling phase	15	Same	6–12	Moderate	Grayish yellow	Light yellowish brown	Friable	4–8
Jn	Johnsburg loam	5	Reddium weathered from interbedded sandstone and shale.	0–6	Moderately slow	Brownish gray to weak yellow	Pale yellow mottled with gray and rust brown.	Friable to firm	3–6
La	Lickdale silt loam	5	Colluvium and local alluvium from uplands underlain by sandstone and shale.	0–6	Very slow	Light brownish gray to yellowish gray.	Light gray to light olive gray	Firm but moderately friable; moderately plastic in lower part.	3–6
Lb	Limestone rockland, rolling	21	Limestone residuum (much of area covered by limestone outcrops with Colbert soil material between outcrops).	6–12	Slow	Light brownish gray or yellowish gray.	Yellow mottled with gray and brown	Very strongly plastic	0–4
Lc	Limestone rockland, rough	21	Same	12–45	Slow	Same	Same	Very strongly plastic	0–4
Ld	Lindside silty clay loam	1	Alluvium from uplands underlain mainly by limestone.	0–2	Slow	Brown	Mottled brown, gray, and pale yellow.	Moderately plastic	4–12
Lk	Linker fine sandy loam, undulating phase	14	Residuum weathered from sandstone and some shale	2–5	Moderate	Light brownish gray	Light brown to moderate reddish brown.	Friable	3–6
Lg	Linker fine sandy loam, eroded undulating phase	14	Same	2–5	Moderate	Light yellowish brown	Same	Friable	3–6
Ll	Linker fine sandy loam, rolling phase	15	Same	5–10	Moderate	Light brownish gray	Same	Friable	3–6
Lr	Linker fine sandy loam, eroded rolling phase	15	Same	5–10	Moderate	Light yellowish brown	Same	Friable	3–6
Le	Linker fine sandy loam, eroded hilly phase	16	Same	10–20	Moderate	Light yellowish brown	Same	Friable	2–6
Ll	Linker loam, severely eroded rolling phase	18	Same	5–10	Moderate	Yellowish brown to reddish brown	Same	Friable	2–6
Ma	Melvin silt loam	6	Alluvium from uplands underlain by limestone	0–2	Very slow	Brownish gray	Medium gray mottled with brown	Moderately plastic	4–8
Mb	Monongahela fine sandy loam	3	Old alluvium from uplands underlain by sandstone and shale.	0–6	Slow	Light brownish gray to yellowish gray.	Light yellowish brown mottled with gray, pale yellow, and rusty brown.	Friable to firm	4–8
Mo	Muskingum fine sandy loam, hilly phase	16	Residuum weathered from sandstone and shale	10–20	Moderate to rapid	Brownish gray	Light yellowish brown	Moderately friable	1–4
Mc	Muskingum fine sandy loam, eroded hilly phase	16	Same	10–20	Moderate to rapid	Brownish gray	Light yellowish brown	Moderately friable	1–4
Mg	Muskingum stony fine sandy loam, rolling phase	17	Same	5–10	Moderate to rapid	Brownish gray	Light yellowish brown	Moderately friable	1–4
Mr	Muskingum stony fine sandy loam, hilly phase	17	Same	10–20	Moderate to rapid	Brownish gray	Light yellowish brown	Moderately friable	1–4
Me	Muskingum stony fine sandy loam, eroded hilly phase	17	Same	10–20	Moderate to rapid	Brownish gray	Light yellowish brown	Moderately friable	1–4
Mt	Muskingum stony fine sandy loam, steep phase	19	Same	20+	Moderate to rapid	Brownish gray	Light yellowish brown	Moderately friable	1–3
Nn	Nolichucky fine sandy loam, undulating phase	14	General alluvium derived mainly from lands underlain by sandstone and shale.	2–6	Moderate	Light brownish gray to yellowish brown.	Pale reddish brown	Friable	4–10
Na	Nolichucky fine sandy loam, eroded undulating phase	14	Same	2–6	Moderate	Same	Pale reddish brown	Friable	4–10
Nd	Nolichucky gravelly fine sandy loam, eroded undulating phase.	14	Same	2–6	Moderate	Same	Pale reddish brown	Friable	4–10
Nf	Nolichucky gravelly fine sandy loam, rolling phase	15	Same	6–12	Moderate	Medium gray to yellowish gray	Pale reddish brown	Friable	4–10
Ne	Nolichucky gravelly fine sandy loam, eroded rolling phase	15	Same	6–12	Moderate	Yellowish gray	Pale reddish brown	Friable	6–12
Nh	Nolichucky gravelly fine sandy loam, hilly phase	16	Same	12–20	Moderate	Medium gray to yellowish gray	Pale reddish brown	Friable	4–8
Os	Ooltewah silt loam	1	Local alluvium and colluvium derived mainly from lands underlain by limestone.	0–2	Slow	Moderate brown to weak reddish brown.	Brownish gray mottled with rust brown.	Moderately firm but friable.	4–8
Oa	Ooltewah fine sandy loam	1	Local alluvium and colluvium derived mainly from lands underlain by limestone and sandstone.	0–2	Slow	Brownish gray to grayish brown; brown to pale yellowish brown in subsurface layer.	Gray to brownish gray mottled with whitish gray and rust brown.	Same	4–8
Pc	Pearman loam, undulating phase	11	Residuum weathered from interbedded sandstone, limestone, and some shale.	2–6	Slow	Light brownish gray to light yellowish brown.	Moderate yellowish brown	Same	4–8
Pn	Pearman loam, eroded undulating phase	11	Same	2–6	Slow	Light yellowish brown	Moderate yellowish brown	Same	4–8
Pa	Pearman loam, eroded rolling phase	10	Same	6–12	Slow	Light yellowish brown	Moderate yellowish brown	Same	4–8
Pd	Pearman silty clay loam, severely eroded rolling phase	9	Same	6–12	Slow	Light yellowish brown	Moderate yellowish brown	Same	4–8
Pe	Philo fine sandy loam	2	Alluvium from uplands underlain mainly by sandstone and shale.	0–2	Slow	Light yellowish brown	Yellowish gray to weak yellow, mottled gray and rusty brown.	Friable	4–8
Pr	Philo-Lindside soils, undifferentiated	2	Alluvium from uplands underlain by sandstone, limestone, and some shale.	0–2	Slow	(See Philo and Lindside soils)	(See Philo and Lindside soils)	(See Philo and Lindside soils).	4–8
Pg	Pope fine sandy loam	2	Alluvium from uplands underlain mainly by sandstone with some shale.	0–2	Moderate	Brownish gray to brown	Brown to yellowish brown	Friable	4–10
Pk	Pottsville shaly silt loam, hilly phase	17	Residuum weathered mainly from shale but with some sandstone.	10–20	Moderate	Brownish gray to yellowish brown	Yellowish brown to light brownish gray.	Friable in upper part; firm and plastic in lower part when wet.	2–4
Ph	Pottsville shaly silt loam, eroded hilly phase	17	Same	10–20	Moderate	Yellowish brown	Same	Same	2–4
Pl	Pottsville shaly silt loam, severely eroded hilly phase	19	Same	10–20	Moderate	Yellowish brown	Same	Same	2–4
Pm	Pottsville shaly silt loam, steep phase	19	Same	20+	Moderate	Brownish gray to yellowish brown	Gray and reddish brown	Same	2–4
Ra	Robertsville silt loam	5	General alluvium from uplands underlain mainly by limestone.	0–2	Very slow	Brownish gray	Light gray to medium gray, mottled.	Moderately plastic when wet.	4–10
Rn	Rough gullied land (Decatur and Cumberland soil materials).	21	Residuum and general alluvium weathered mainly from limestone.	2–20	Moderate	Reddish brown or grayish brown	Strong reddish brown to moderate brown.	Friable	4–12
Rc	Rough gullied land (Linker and Hartsells soil materials)	21	Residuum mainly from weathered sandstone and shale.	6–20	Moderate	Brownish gray to light brown	Moderate yellow or moderate reddish brown.	Friable	2–8
Sa	Sequatchie fine sandy loam	14	General alluvium derived mainly from land underlain by sandstone but some shale.	2–6	Moderate	Brown to yellowish brown	Light brown or yellowish brown	Friable	4–10
Ss	Sequatchie fine sandy loam, eroded phase	14	Same	2–6	Moderate	Yellowish brown	Same	Friable	4–10
Sr	Stony smooth land (Talbott and Colbert soil materials)	20	Residuum material weathered mainly from clayey limestone.	2–6	Slow to very slow	Brownish gray or yellowish brown	Yellowish brown or reddish brown mottled with gray.	Moderately to strongly plastic.	2–6
Sc	Stony rolling land (Talbott and Colbert soil materials)	20	Same	6–12	Same	Same	Same	Same	2–6
So	Stony rough land (Muskingum soil material)	21	Residuum weathered mainly from sandstone and shale.	12–45	Moderate to rapid	Brownish gray	Light yellowish brown	Friable	2–6
Ta	Taft silt loam	3	Old alluvium derived mainly from land underlain by limestone.	0–2	Slow	Light brownish gray to brownish gray.	Light yellowish brown, mottled in lower part.	Compact to firm; moderately plastic when wet.	4–10
Te	Talbott loam, eroded undulating phase	11	Residuum weathered mainly from clayey limestone	2–6	Slow	Grayish brown to moderate brown	Weak reddish brown	Moderately to strongly plastic.	4–8
To	Talbott loam, eroded rolling phase	10	Same	6–12	Slow	Same	Weak reddish brown	Same	4–8
Tf	Talbott silt loam, undulating phase	11	Same	2–6	Slow	Brownish gray to moderate brown	Weak reddish brown	Same	4–8
Tc	Talbott silty clay loam, eroded undulating phase	12	Same	2–6	Slow	Moderate brown	Weak reddish brown	Same	4–8
Th	Talbott silty clay loam, eroded rolling phase	10	Same	6–12	Slow	Moderate brown	Weak reddish brown	Same	4–8
Tl	Talbott silty clay loam, severely eroded rolling phase	9	Same	6–12	Slow	Moderate brown	Weak reddish brown	Same	3–6
Tg	Talbott silty clay loam, eroded hilly phase	13	Same	12–20	Slow	Moderate brown	Weak reddish brown	Same	3–6
Tc	Talbott cherty silty clay loam, eroded rolling phase	10	Same	6–12	Slow	Moderate brown	Weak reddish brown	Same	3–6
Tb	Talbott cherty silty clay loam, eroded hilly phase	13	Same	12–20	Moderately slow	Moderate brown	Weak reddish brown	Same	3–6
Tp	Tilsit silt loam, level phase	14	Residuum weathered mainly from interbedded shale and sandstone.	0–2	Slow	Brownish gray to light yellowish brown.	Yellowish brown, mottled with gray and rust brown.	Firm but friable	4–8
Ts	Tilsit silt loam, undulating phase	14	Same	2–5	Slow	Same	Same	Firm but friable	4–8
To	Tilsit silt loam, eroded undulating phase	14	Same	2–5	Moderate to moderately slow.	Same	Same	Firm but friable	4–8
Tr	Tilsit silt loam, rolling phase	15	Same	5–10	Slow	Same	Same	Firm but friable	4–8
Tn	Tilsit silt loam, eroded rolling phase	15	Same	5–10	Slow	Grayish yellow	Same	Firm but friable	4–8
Tm	Tilsit clay loam, severely eroded rolling phase	18	Same	5–10	Slow	Yellowish brown	Same	Firm but friable	4–8
Tu	Tupelo silt loam	3	Old alluvium from uplands underlain by limestone but with some sandstone and shale.	0–2	Slow to very slow	Light brownish gray to weak yellow	Yellowish brown mottled with gray, yellow, and rusty brown.	Plastic when wet	6–10
Tr	Tupelo loam	3	Same	0–2	Same	Light brownish gray to yellowish gray.	Same	Plastic when wet	6–10
Tw	Tyler silt loam	5	Old alluvium from uplands underlain mainly by sandstone and shale	0–2	Very slow	Medium gray to whitish gray	Light gray mottled with rust brown and yellow.	Plastic when wet	4–8
Tv	Tyler fine sandy loam	5	Same	0–2	Very slow	Same	Same	Plastic when wet	4–8
Wo	Waynesboro fine sandy loam, undulating phase	14	General alluvium from uplands underlain chiefly by sandstone.	2–6	Moderate	Moderate yellowish brown	Moderate brown to reddish brown	Friable	6–10
Wb	Waynesboro fine sandy loam, eroded undulating phase	14	Same	2–6	Moderate	Grayish brown to reddish brown	Same	Friable	6–10
Wa	Waynesboro fine sandy loam, eroded rolling phase	15	Same	6–12	Moderate	Same	Same	Friable	6–10
Wc	Waynesboro fine sandy loam, severely eroded rolling phase	18	Same	6–12	Moderate	Reddish brown	Same	Friable	6–10
We	Wolftever silt loam	3	Old alluvium from uplands underlain chiefly by limestone.	2–6	Moderately slow	Light grayish brown to moderate yellowish brown.	Yellowish brown	Friable to firm	6–12

[1] The soils are grouped according to similar management requirements in the section, Use and Management of Morgan County Soils, and these groups are represented on the soil map.

[2] Consistence of soil when moist, not dry.

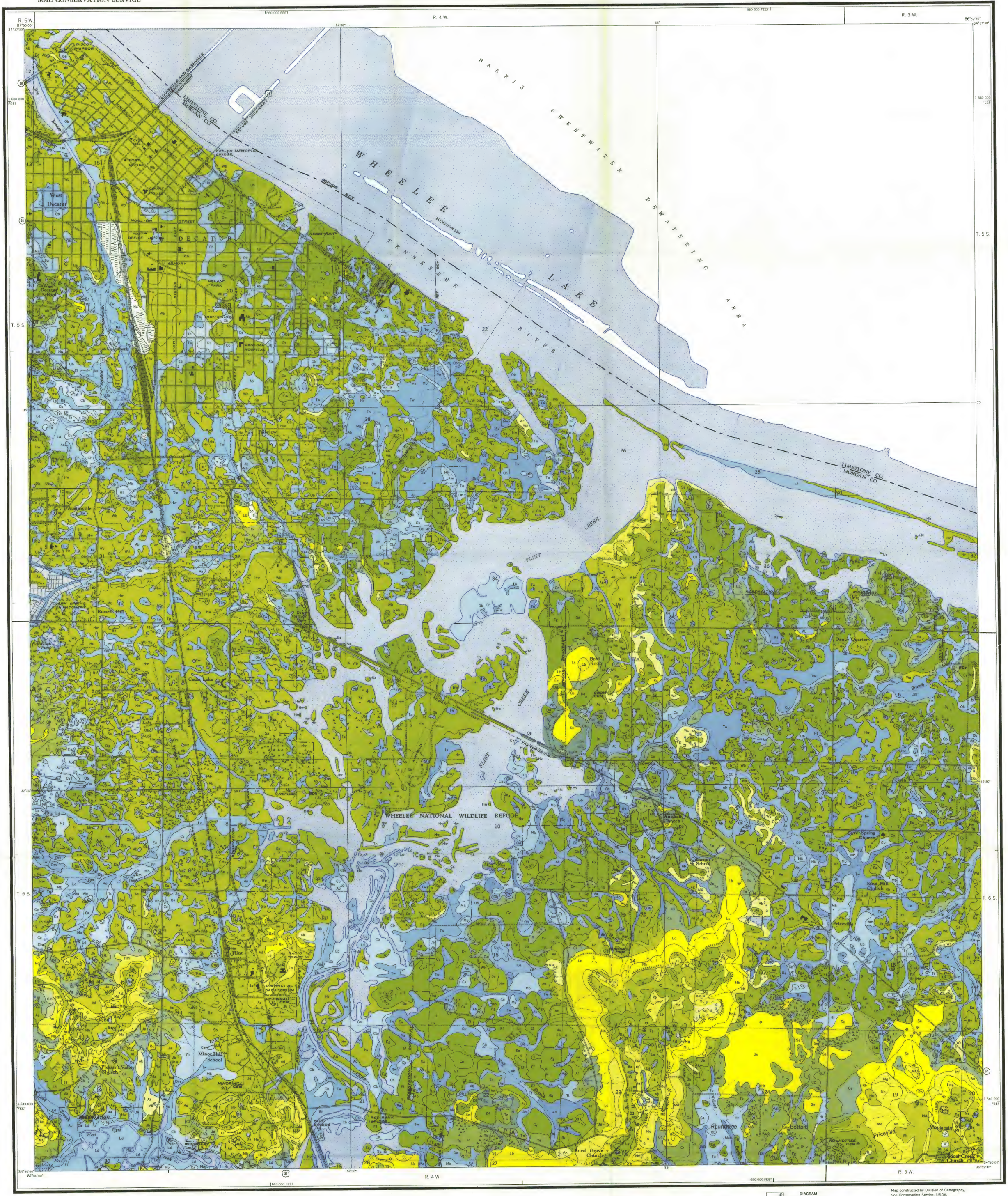
[3] Depth of the soil profile over bedrock, partly weathered rock, gravel beds, or other material.

[4] The term "moderate" refers to the optimum internal drainage for most crops grown in the county.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY–ALABAMA
DECATUR QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY



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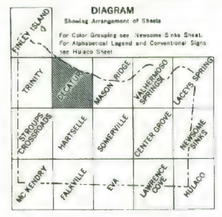
1 ½ 0 1 2 Miles
5 000 0 5 000 10 000 Feet

U. S. GOVERNMENT PRINTING OFFICE: 1948 O—69486

DIAGRAM
Showing Arrangement of Sheets
For Color Grouping see Newsome Sinks Sheet.
For Alphabetical Legend and Conventional Signs see Hillabee Sheet.



Map constructed by Division of Cartography, Soil Conservation Service, USDA, from TVA topographic and planimetric quadrangles. Soils surveyed on 1937 aerial photographs. Polyconic projection, 1927 North American datum. 10000-foot grid based on Alabama (West) rectangular coordinate system.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY—ALABAMA
EVA QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY

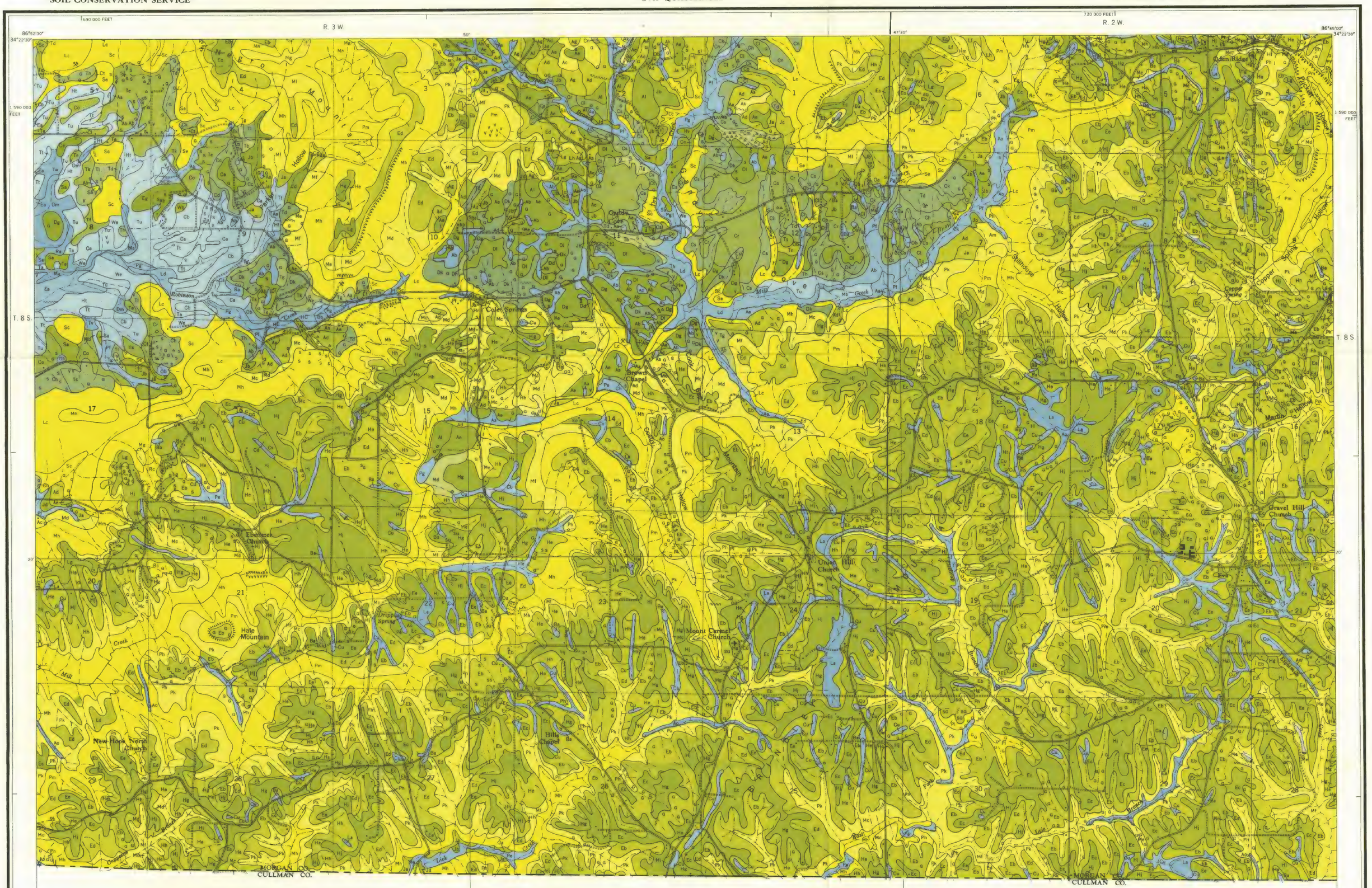


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DIAGRAM
Showing Arrangement of Sheets
For Color Grouping see Newsome Sinks Sheet.
For Alphabetical Legend and Conventional Signs see Hulaco Sheet.

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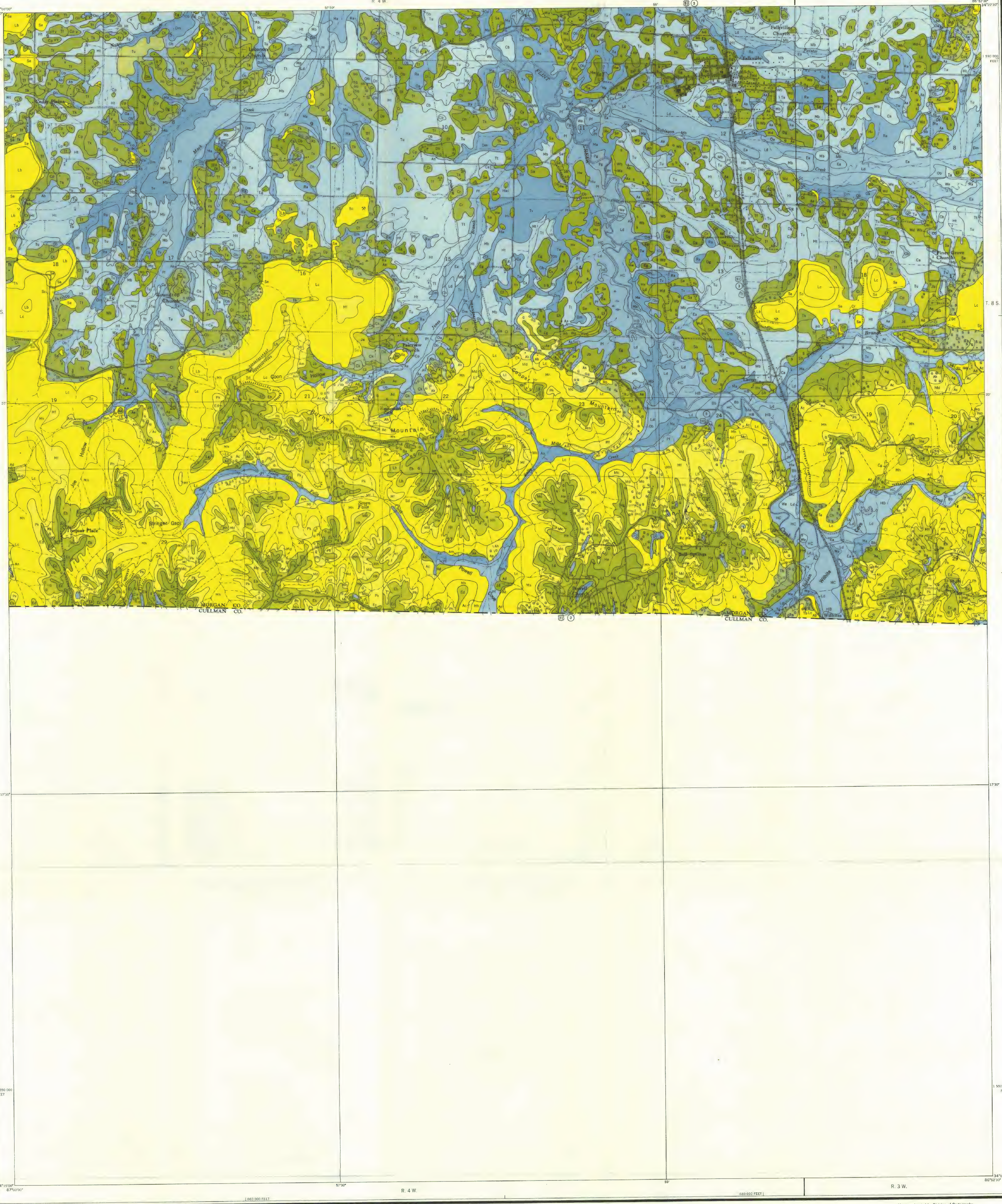
Soils surveyed on 1937 aerial photographs.
Polyconic projection, 1927 North American datum.
10000-foot grid based on Alabama (West) rectangular coordinate system.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY–ALABAMA
FALKVILLE QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY



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1 0 1 2 Miles
5 000 0 5 000 10 000 Feet

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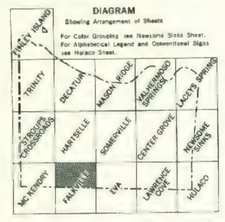
DIAGRAM
Showing Arrangement of Sheets
For Color Grouping see Newsprint Slide Sheet.
For Alphabetical Legend and Conventional Signs see Hatpin Sheet.



Map constructed by Division of Cartography, Soil Conservation Service, USDA, from TVA topographic and planimetric quadrangles.
Soils surveyed on 1937 aerial photographs.
Polyconic projection, 1927 North American datum.
10000-foot grid based on Alabama (West) rectangular coordinate system.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY—ALABAMA
FINLEY ISLAND QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY

1620 000 FEET — 650 000 FEET

87°07'30" — 05' — 02'30" — 87°00'00"

34°45'00"

R. 5 W.

1 720 000 FEET

42'30"

INSET

MATCH FINLEY ISLAND QUADRANGLE

WHEELER LAKE

LIMESTONE CO.
MORGAN CO.

DECATUR "CITY LIMITS"

34°
37'30"
87°00'00"

MATCH DECATUR QUADRANGLE

LIMESTONE CO.
LAWRENCE CO.
MORGAN CO.

W H E E L E R

ELEVATION 556

L A K E

TENNESSEE RIVER

T. 4 S.

40'

FINLEY ISLAND CABIN SITE AREA

Baker's Creek

LIMESTONE CO.
MORGAN CO.

1 690 000 FEET

T. 5 S.

34°37'30"
87°07'30"

20

05'

02'30"

34°37'30"
87°00'00"

R. 5 W.

1620 000 FEET

650 000 FEET

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Scale 1:15,840

1 ½ 0 1 2 Miles

5 000 0 5 000 10 000 Feet

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DIAGRAM
Showing Arrangement of Sheets

Per Color Grouping see Awesome Sheet.
For Alphabetical Legend and Conventional Signs see Hobco Sheet.

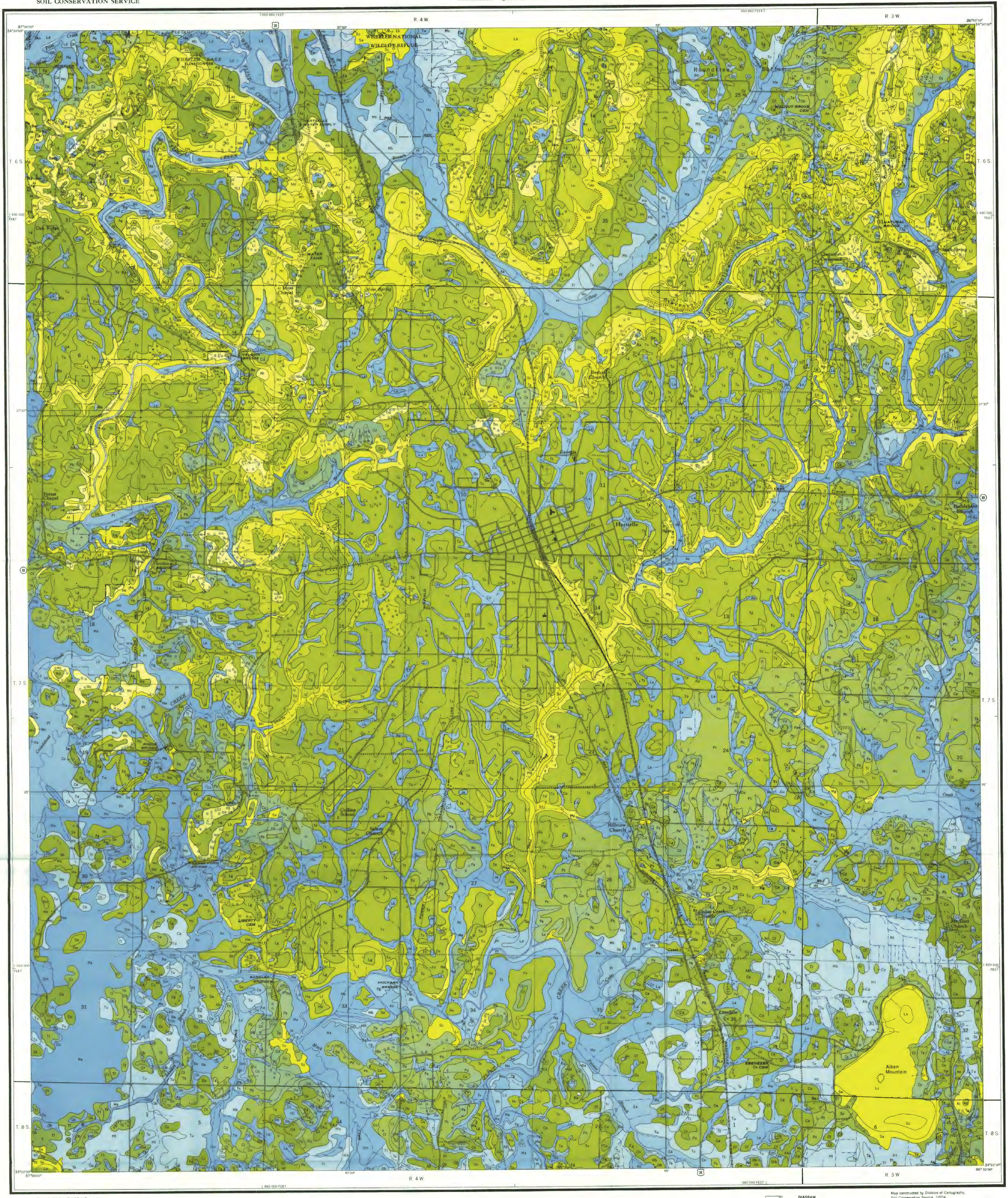
FINLEY ISLAND				
TRINITY	DECATUR	MASON GROVE	VALLEYWOOD SPRINGS	LACKEY SPRING
ATHENS CROSSROADS	HARTSELLE	SOMERVILLE	CENTER GROVE	NEWBURG CROSS
MONTGOMERY	FALKVILLE	ION	LAWRENCE GROVE	HULACO

Map constructed by Division of Cartography, Soil Conservation Service, USDA, from TVA topographic and planimetric quadrangles.
Soils surveyed on 1937 aerial photographs.
Polyconic projection, 1927 North American datum.
10000-foot grid based on Alabama (West) rectangular coordinate system.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY—ALABAMA
HARTSELLE QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY



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1 ½ 0 1 2 Miles
5 000 0 5 000 10 000 Feet

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DIAGRAM
Showing Arrangement of Sheets
For Color Grouping see Inreverse Side Sheet
For Alphabetical Legend and Conventional Signs see Hickso Sheet.

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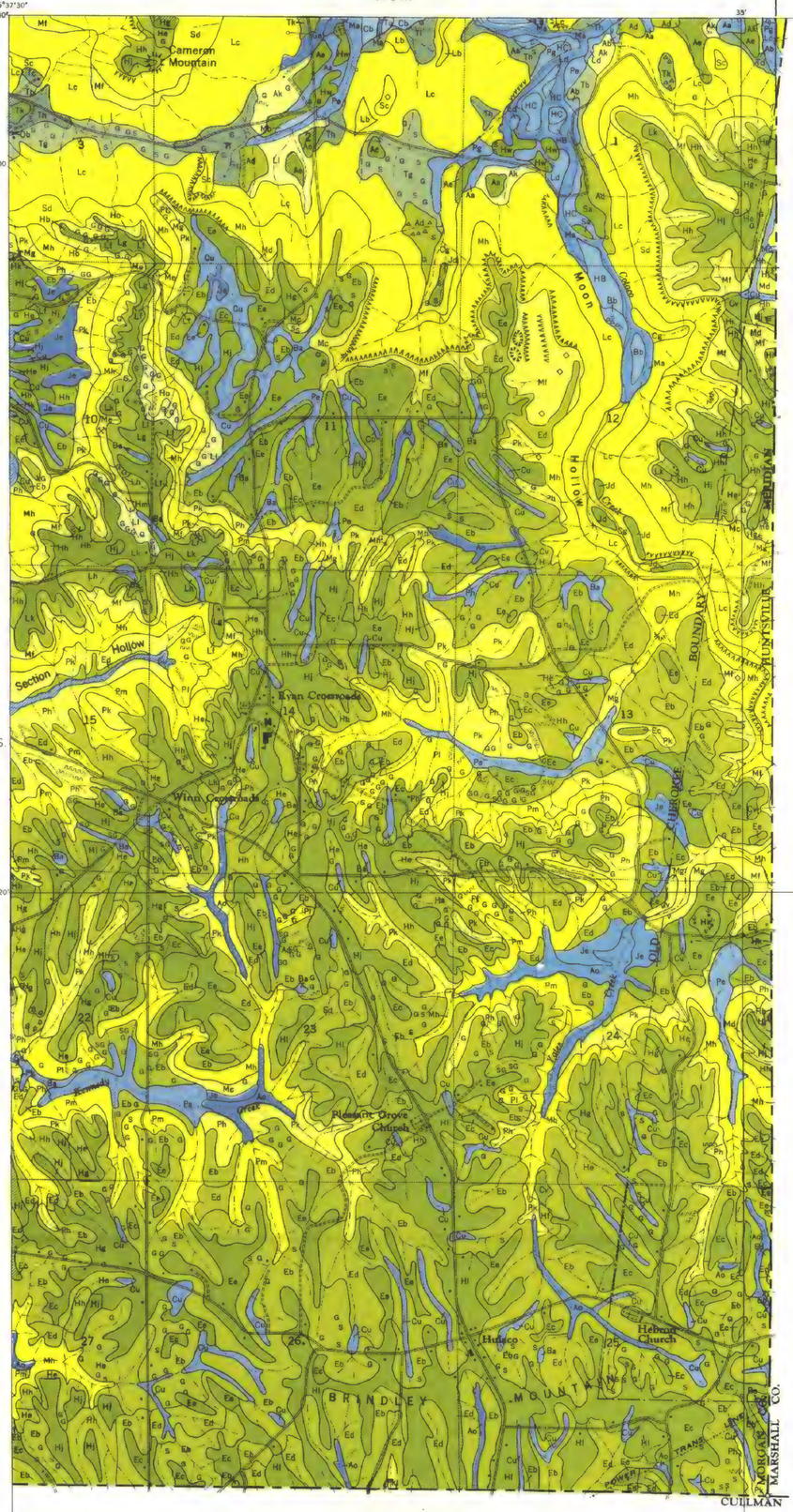
Soils surveyed on 1937 aerial photographs.
Polyconic projection, 1927 North American datum.
10000-foot grid based on Alabama (West) rectangular coordinate system.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY–ALABAMA
HULACO QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY



LEGEND

Aa Abernathy fine sandy loam	Cd Christian loam, eroded rolling phase	Cy **Cumberland** silty clay loam, eroded undulating phase	Ef Etowah loam, level phase	Ho Hector fine sandy loam, severely eroded hilly phase	Jd Jefferson fine sandy loam, undulating phase	Mg **Muskingum** stony fine sandy loam, rolling phase	Pk Pottsville shaly silt loam, hilly phase	Th **Talbott** silty clay loam, eroded rolling phase
Ab Abernathy silt loam	Ce Christian loam, eroded undulating phase	Cz Cumberland silty clay loam, severely eroded rolling phase	Eg Etowah loam, undulating phase	Hp Hector stony fine sandy loam, eroded hilly phase	Je Johnsburg loam	Mh Muskingum stony fine sandy loam, steep phase	Pl Pottsville shaly silt loam, severely eroded hilly phase	Tk Talbott silty clay loam, eroded undulating phase
Ac Allen fine sandy loam, eroded hilly phase	Cf Christian loam, undulating phase	Da **Decatur** silt loam, undulating phase	Eh Etowah silty clay loam, eroded undulating phase	Hq Hector stony fine sandy loam, hilly phase	La **Lickdale** silt loam	Na **Nolichucky** fine sandy loam, eroded undulating phase	Pm Pottsville shaly silt loam, steep phase	Tl Talbott silty clay loam, severely eroded rolling phase
Ad Allen fine sandy loam, eroded rolling phase	Cg Cobbly colluvium (Jefferson soil material)	Db Decatur silty clay loam, eroded undulating phase	Ga Guthrie silt loam	Hr Hector stony fine sandy loam, steep phase	Lb Limestone rockland, rolling	Nb Nolichucky fine sandy loam, undulating phase	Ra **Robertsville** silt loam	Tm Tilsit clay loam, severely eroded rolling phase
Ae Allen fine sandy loam, eroded undulating phase	Ch Colbert cherty silt loam, rolling phase	Dc Decatur silty clay loam, severely eroded rolling phase	Ha Hanceville fine sandy loam, eroded rolling phase	Hs Hollywood loam	Lc Limestone rockland, rough	Nc Nolichucky gravelly fine sandy loam, eroded rolling phase	Rb Rough gullied land (Decatur and Cumberland soil materials)	Tn Tilsit silt loam, eroded rolling phase
Af Allen fine sandy loam, hilly phase	Ck Colbert loam, eroded rolling phase	Dd Dewey cherty silt loam, undulating phase	Hb Hanceville fine sandy loam, eroded undulating phase	Ht Hollywood silty clay	Ld Lindside silty clay loam	Nd Nolichucky gravelly fine sandy loam, eroded undulating phase	Rc Rough gullied land (Linker and Hartsells soil materials)	To **Tilsit** silt loam, eroded undulating phase
Ag Allen fine sandy loam, rolling phase	Cl Colbert loam, eroded undulating phase	De Dewey cherty silty clay loam, eroded rolling phase	Hc Hanceville fine sandy loam, undulating phase	Hu **Holston** fine sandy loam, eroded undulating phase	Le Linker fine sandy loam, eroded hilly phase	Ne Nolichucky gravelly fine sandy loam, hilly phase	Sa Sequatchie fine sandy loam	Tp Tilsit silt loam, level phase
Ah Allen fine sandy loam, severely eroded hilly phase	Cm Colbert loam, hilly phase	Df Dewey cherty silty clay loam, eroded undulating phase	Hd **Hanceville** loam, severely eroded rolling phase	Hv Holston fine sandy loam, level phase	Lf Linker fine sandy loam, eroded rolling phase	Nf Nolichucky gravelly fine sandy loam, rolling phase	Sb Sequatchie fine sandy loam, eroded phase	Tr Tilsit silt loam, rolling phase
Ak Allen fine sandy loam, severely eroded rolling phase	Cn Colbert loam, rolling phase	Dg Dewey silt loam, undulating phase	He **Hartsells** fine sandy loam, eroded rolling phase	Hw Holston fine sandy loam, undulating phase	Lg **Linker** fine sandy loam, eroded undulating phase	Oa Ooltewah fine sandy loam	Sc Stony rolling land (Talbott and Colbert soil materials)	Ts Tilsit silt loam, undulating phase
Al Allen fine sandy loam, undulating phase	Co Colbert loam, undulating phase	Dh Dewey silty clay loam, eroded hilly phase	Hf Hartsells fine sandy loam, eroded rolling shallow phase	Hx **Holston** gravelly fine sandy loam, eroded rolling phase	Lh Linker fine sandy loam, rolling phase	Ob Ooltewah silt loam	Sd Stony rough land (Muskingum soil material)	Tt Tupelo loam
Am Allen stony fine sandy loam, eroded rolling phase	Cp Colbert silt loam, level phase	Dk Dewey silty clay loam, eroded rolling phase	Hg Hartsells fine sandy loam, eroded undulating phase	Hy Holston gravelly fine sandy loam, eroded undulating phase	Lk Linker fine sandy loam, undulating phase	Pa Pearman loam, eroded rolling phase	Se Stony smooth land (Talbott and Colbert soil materials)	Tu Tupelo silt loam
An Allen stony fine sandy loam, hilly phase	Cr Colbert silt loam, undulating phase	Dl Dewey silty clay loam, eroded undulating phase	Hh Hartsells fine sandy loam, rolling phase	Hz Holston gravelly fine sandy loam, rolling phase	Ll Linker loam, severely eroded rolling phase	Pb Pearman loam, eroded undulating phase	Ta Taft silt loam	Tv Tyler fine sandy loam
Ao Atkins silt loam	Cs Colbert silty clay loam, eroded rolling phase	Dm Dunning silty clay	Hi Hartsells fine sandy loam, rolling shallow phase	HA Holston gravelly fine sandy loam, undulating phase	Ma **Melvin** silt loam	Pc Pearman loam, undulating phase	Tb Talbott cherty silty clay loam, eroded hilly phase	Tw Tyler silt loam
Ba Barbourville fine sandy loam	Ct Colbert silty clay loam, eroded undulating phase	Ea **Egam** silty clay loam	Hj Hartsells fine sandy loam, undulating phase	HB Huntington fine sandy loam, sanded phase	Mb Monongahela fine sandy loam	Pd **Pearman** silty clay loam, severely eroded rolling phase	Tc Talbott cherty silty clay loam, eroded rolling phase	Wa Waynesboro fine sandy loam, eroded rolling phase
Bb Bruno loamy fine sand	Cu Cotaco loam	Eb Enders loam, eroded rolling phase	Hk Hartsells fine sandy loam, undulating shallow phase	HC **Huntington** silt loam	Mc Muskingum fine sandy loam, eroded hilly phase	Pe Philo fine sandy loam	Td Talbott loam, eroded rolling phase	Wb Waynesboro fine sandy loam, eroded undulating phase
Ca Captina and Capshaw loams, undifferentiated	Cv Crossville loam, undulating phase	Ec Enders loam, eroded undulating phase	Hl Hartsells loam, undulating phase	Ja Jefferson fine sandy loam, eroded rolling phase	Md **Muskingum** fine sandy loam, hilly phase	Pf Philo-Lindside soils, undifferentiated	Te Talbott loam, eroded undulating phase	Wc Waynesboro fine sandy loam, severely eroded rolling phase
Cb Captina and Capshaw silt loams, undifferentiated	Cw **Cumberland** silt loam, level phase	Ed Enders loam, rolling phase	Hm Hector fine sandy loam, eroded hilly phase	Jb **Jefferson** fine sandy loam, eroded undulating phase	Me Muskingum stony fine sandy loam, eroded hilly phase	Pg Pope fine sandy loam	Tf Talbott silt loam, undulating phase	Wd Waynesboro fine sandy loam, undulating phase
Cc Christian clay loam, severely eroded rolling phase	Cx **Cumberland** silt loam, undulating phase	Ee Enders loam, undulating phase	Hn Hector fine sandy loam, hilly phase	Jc **Jefferson** fine sandy loam, rolling phase	Mf Muskingum stony fine sandy loam, hilly phase	Ph **Pottsville** shaly silt loam, eroded hilly phase	Tg **Talbott** silty clay loam, eroded hilly phase	We **Wolftever** silt loam

CONVENTIONAL SIGNS

CULTURE *(Printed in black)*

- City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Fort
- Secondary roads, Trails
- Railroads
- Bridges, Ferry
- Railroad crossings
- Ford, Dam, Sawmill, Windmill
- Boundary lines
- School, Church, Creamery, Cemeteries
- Boundary lines
- Triangulation station, Boundary monument, Oil or Gas wells
- U. S. Township and Section lines, Recovered corners
- Forest fire station, Airway beacon, Oil or Gas tanks
- Transmission line, Oil or Gas pipe line
- Mine or Quarry, Gravel pit, Rock outcrop, Made land
- Soil boundaries, Stony, Gravelly, and Cherty areas

RELIEF *(Printed in brown or black)*

- Contours, Depression contours
- Prominent hills or Mountain peaks
- Sand, Wash, Sand dunes
- Bluff, Escarpment, Mine dumps

DRAINAGE *(Printed in blue)*

- Streams, Springs, Wells, Flowing wells
- Lakes, Ponds, Intermittent lakes
- Unsurveyed and Intermittent streams
- Water pipe lines, Canals, Ditches, Flumes
- Swamp, Salt marsh
- Submerged marsh, Tidal flats

SINK HOLES AND DEPRESSIONS

- Easy to cultivate across
- Difficult to cultivate across
- Containing water most or all of the time

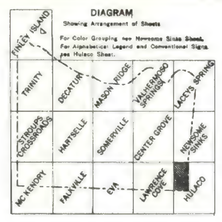
ACCELERATED EROSION

- S Moderate sheet erosion
- SS Severe sheet erosion
- G Moderate gully erosion
- GG Severe gully erosion
- SG Moderate sheet and gully erosion
- Gully

J. Kenneth Ableiter, Chief Soil Correlator.
W. H. Allaway, Chief Analyst, Soil Uses and Productivity.
Roy W. Simonson, Principal Soil Correlator, Southern States.
Area inspected by J. W. Moon, Senior Soil Scientist, Southern States.
Soils surveyed 1941-44 by Hoyt Sherard, In Charge, C. L. McIntyre, H. J. Wesson, and R. S. Farnham, Alabama Department of Agriculture and Industries, and G. A. Swenson, A. H. Hasty, and Robert Wildermuth, U. S. Department of Agriculture.

1 ½ 0 1 2 Miles
5 000 0 5 000 10 000 Feet

DIAGRAM
Showing Arrangement of Sheets
For Color Grouping see Nonsoils Side Sheet. For Alphabetical Legend and Conventional Signs see Hulaco Sheet.



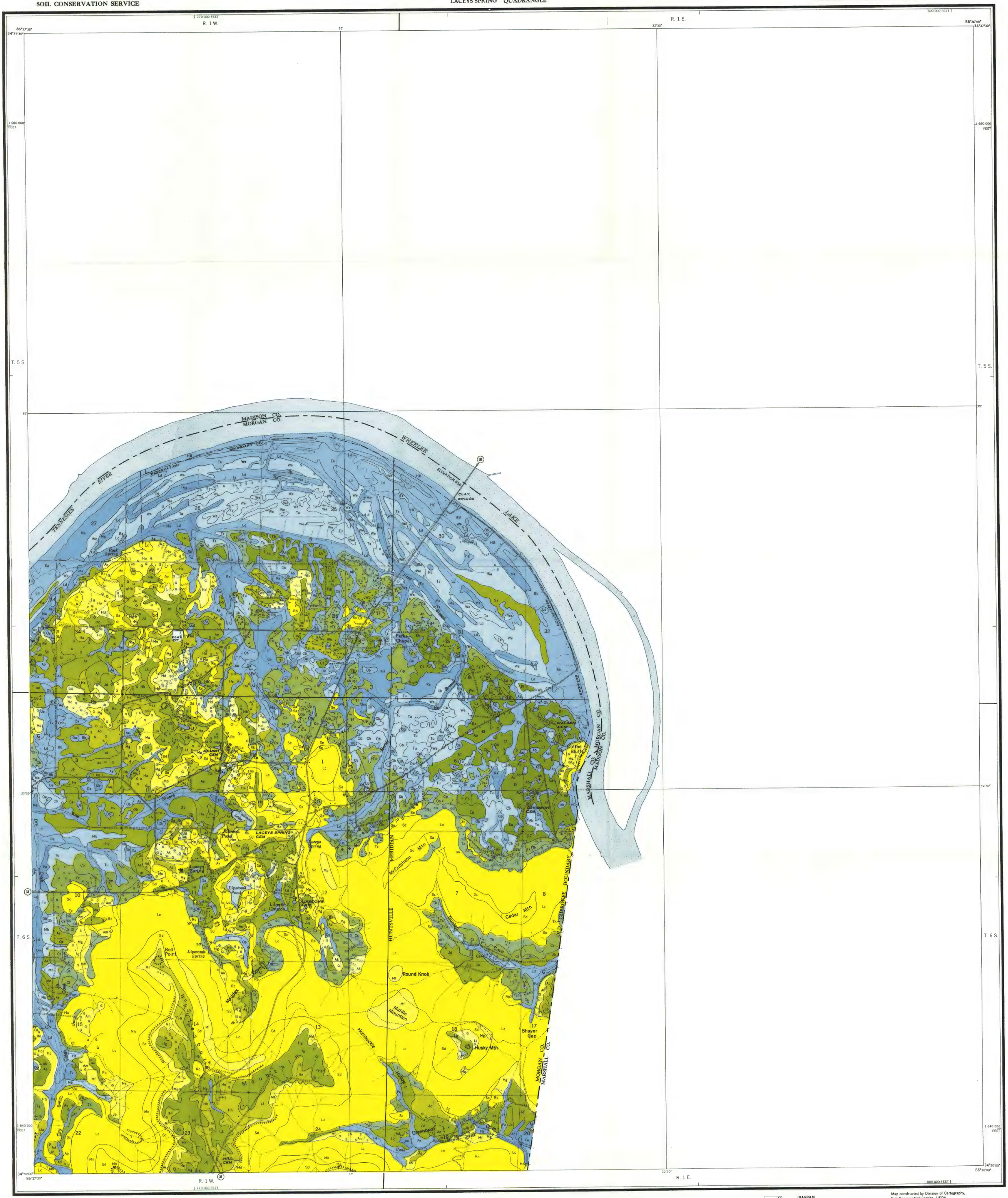
Map constructed by Division of Cartography, Soil Conservation Service, USDA, from TVA topographic and planimetric quadrangles.
Soils surveyed on 1937 aerial photographs.
Polyconic projection, 1927 North American datum.
10000-foot grid based on Alabama (West) rectangular coordinate system.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1956 O—386489

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY—ALABAMA
LACEYS SPRING QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY



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1 ½ 0 1 2 Miles
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DIAGRAM
Showing Arrangement of Sheets
For Color Grouping see Newsome Sinks Sheet.
For Alphabetical Legend and Conventional Signs see Hartselle Sheet.
FINLEY ISLAND
TRINITY | DECATUR | MASON RIDGE | RALEIGH-GOOD SPRINGS | LACEYS SPRING
TRIUNE-CROSSROADS | HARTSELLE | SOMERVILLE | CENTER GROVE | NEWSOME SINKS
MC KENDRY | FALKVILLE | EVA | LAWRENCE COVE | HULACO

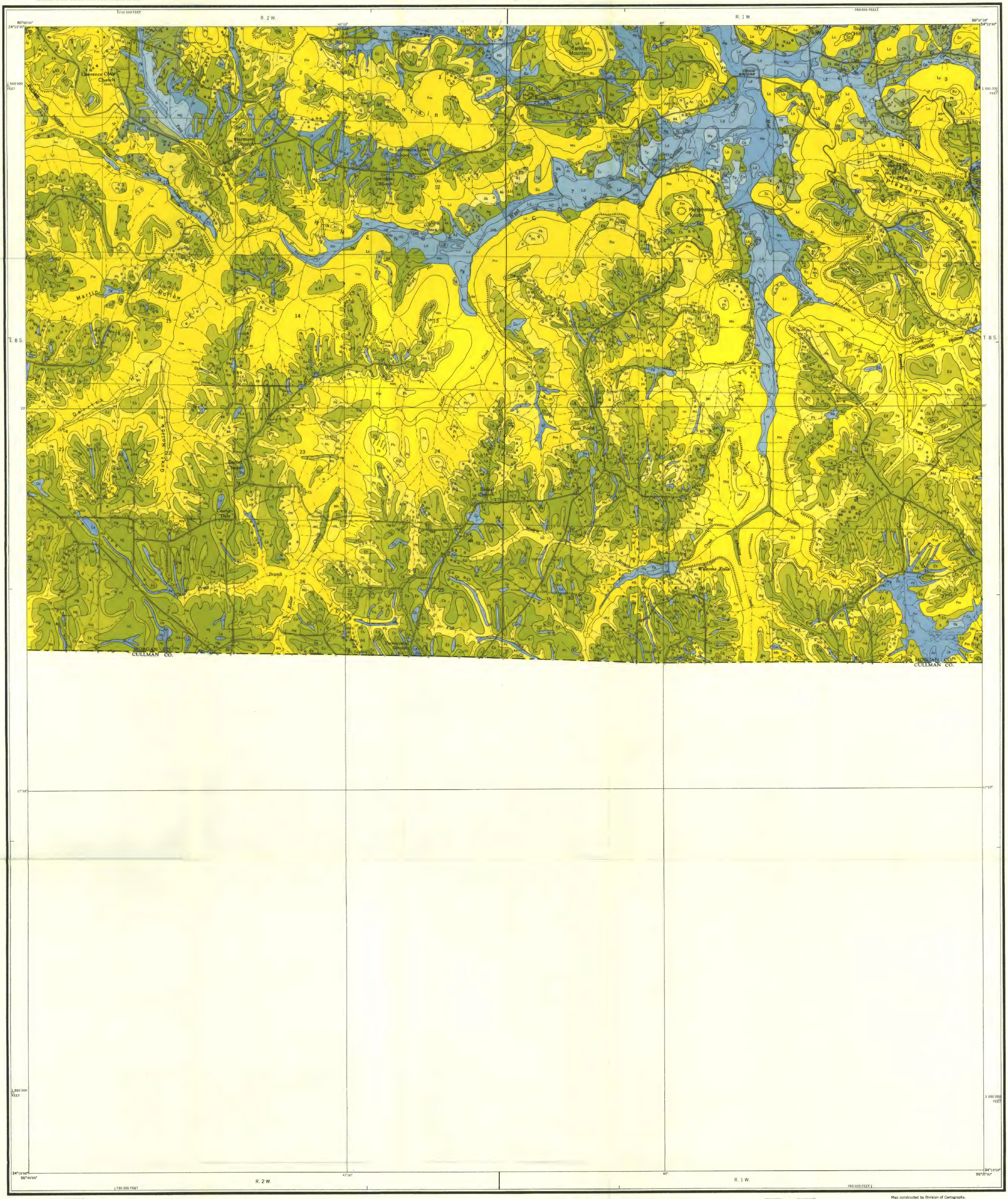
Map constructed by Division of Cartography, Soil Conservation Service, USDA, from TVA topographic and planimetric quadrangles.
Soils surveyed on 1937 aerial photographs.
Polyconic projection, 1927 North American datum.
10 000-foot grid based on Alabama (West) rectangular coordinate system.

U. S. GOVERNMENT PRINTING OFFICE: 1956 O—366486

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY—ALABAMA
LAWRENCE COVE QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY



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1 ½ 0 1 2 Miles
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★ U. S. GOVERNMENT PRINTING OFFICE: 1956 O—359486

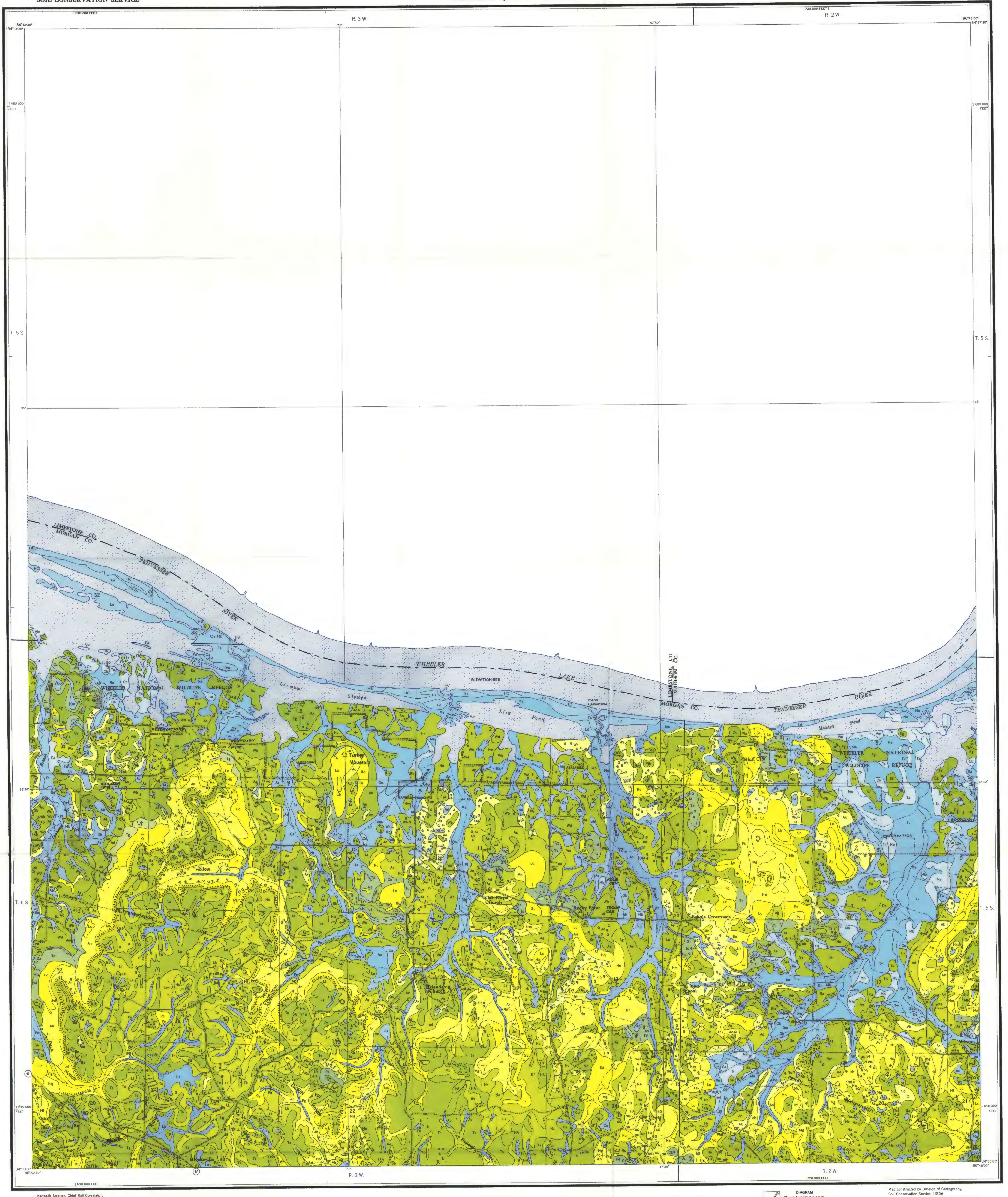
DIAGRAM
Showing Arrangement of Sheets
For Color Grouping see Hemcome Sheet Sheet.
For Alphabetical Legend and Correlations Sheet, see Holeco Sheet.

Map constructed by Division of Cartography, Soil Conservation Service, USDA, from TVA topographic and planimetric quadrangles.
Soils surveyed on 1937 aerial photographs.
Polyconic projection, 1927 North American datum.
10000-foot grid based on Alabama (West) rectangular coordinate system.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY—ALABAMA
MASON RIDGE QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY



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1 ½ 0 1 2 Miles
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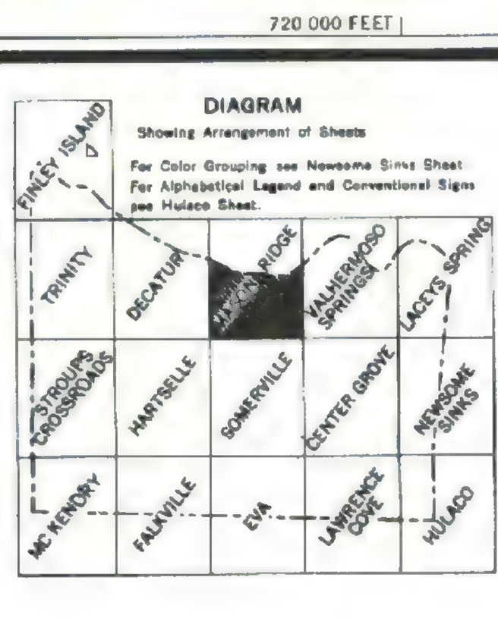
U. S. GOVERNMENT PRINTING OFFICE 1958



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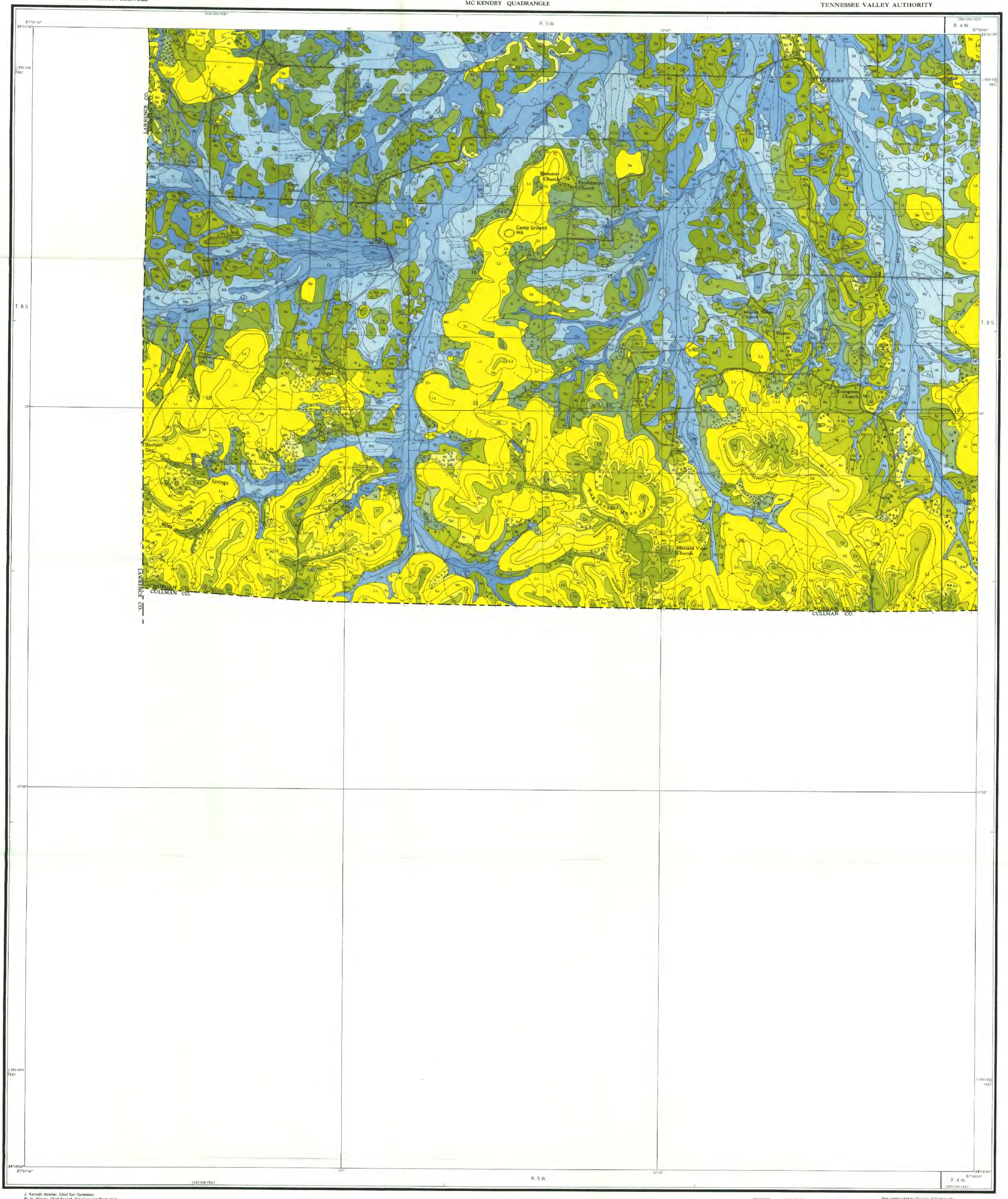
Polyconic projection, 1927 North American datum.
10000-foot grid based on Alabama (West) rectangular coordinate system.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY—ALABAMA
MC KENDRY QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY



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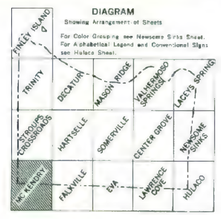
1 ½ 0 1 2 Miles
5 000 0 5 000 10 000 Feet

☆ U. S. GOVERNMENT PRINTING OFFICE: 1958 O—386488

DIAGRAM
Showing Arrangement of Sheets
For Color Grouping see Newsom Soils Sheet. For Alphabetical Legend and Conventional Signs see Hoface Sheet.



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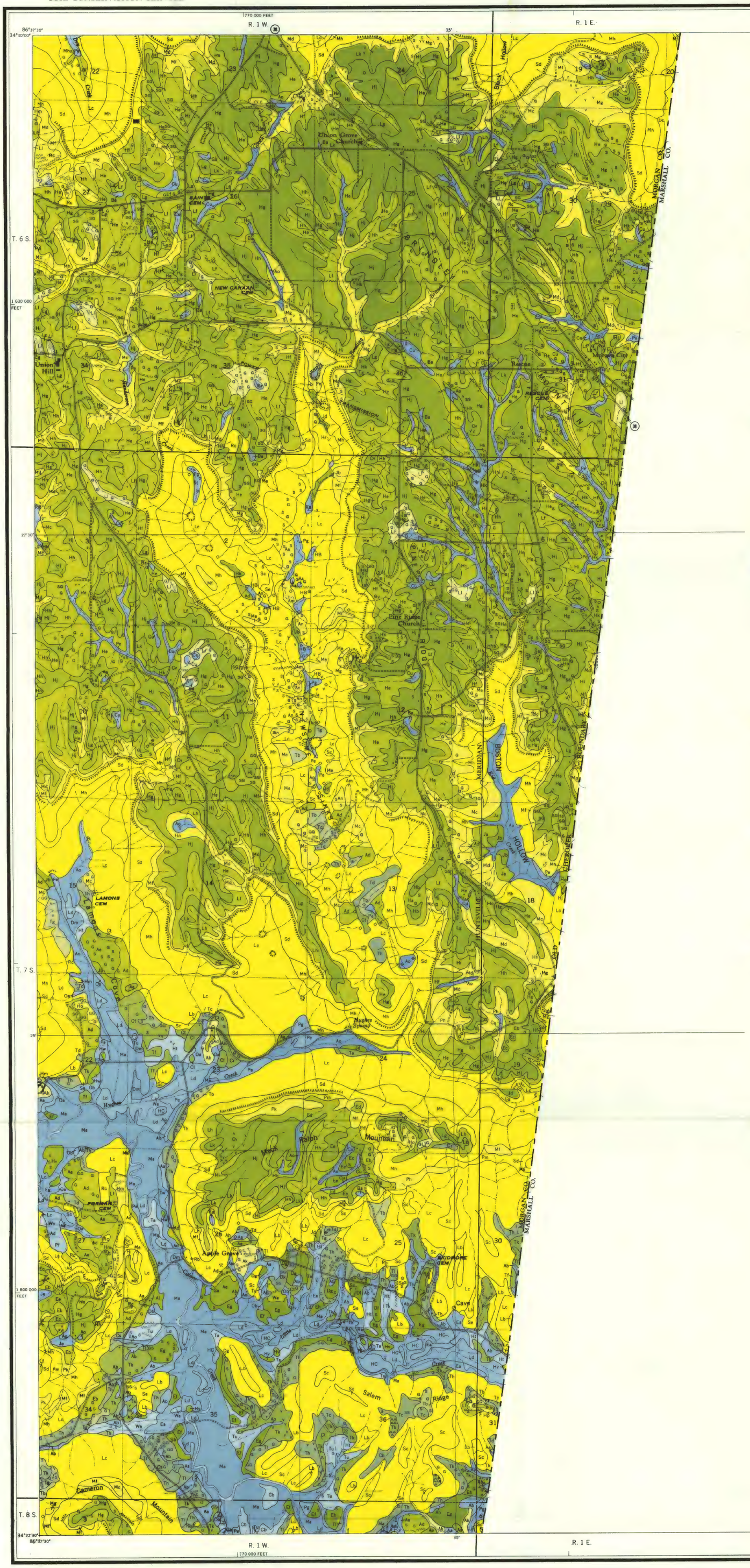
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY—ALABAMA
NEWSOME SINKS QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY



COLOR GROUPING

MANAGEMENT GROUP 1—WELL-DRAINED AND IMPERFECTLY DRAINED SOILS OF THE STREAM BOTTOMS AND DEPRESSIONS, CHIEFLY FROM MATERIALS OF LIMESTONE ORIGIN

- Abernathy silt loam
- Abernathy fine sandy loam
- Egam silty clay loam
- Huntington fine sandy loam, sanded phase
- Huntington silt loam
- Lindside silty clay loam
- Ooltewah fine sandy loam
- Ooltewah silt loam

MANAGEMENT GROUP 2—WELL-DRAINED AND IMPERFECTLY DRAINED SOILS OF THE STREAM BOTTOMS AND COLLUVIAL LANDS, CHIEFLY FROM MATERIALS OF SANDSTONE ORIGIN

- Barbourville fine sandy loam
- Bruno loamy fine sand
- Cotaco loam
- Philo fine sandy loam
- Philo-Lindside soils, undifferentiated
- Pope fine sandy loam

MANAGEMENT GROUP 3—IMPERFECTLY DRAINED STRONGLY ACID SOILS OF THE STREAM TERRACES FROM MIXED MATERIALS

- Captina and Capshaw loams, undifferentiated
- Captina and Capshaw silt loams, undifferentiated
- Monongahela fine sandy loam
- Taft silt loam
- Tupelo loam
- Tupelo silt loam
- Wolftever silt loam

MANAGEMENT GROUP 4—IMPERFECTLY DRAINED DARK-COLORED SOILS OF THE COLLUVIAL LANDS FROM MATERIALS OF LIMESTONE ORIGIN

- Hollywood loam
- Hollywood-silty clay

MANAGEMENT GROUP 5—POORLY DRAINED STRONGLY ACID SOILS OF STREAM BOTTOMS, OLD STREAM TERRACES, AND DEPRESSIONS

- Atkins silt loam
- Guthrie silt loam
- Johnsburg loam
- Lickdale silt loam
- Robertsville silt loam
- Tyler fine sandy loam
- Tyler silt loam

MANAGEMENT GROUP 6—POORLY DRAINED SLIGHTLY ACID TO NEUTRAL SOILS OF THE STREAM BOTTOMS, CHIEFLY FROM MATERIALS OF LIMESTONE ORIGIN

- Dunning silty clay
- Melvin silt loam

MANAGEMENT GROUP 7—UNDULATING MODERATELY PERMEABLE DEEP SOILS CHIEFLY FROM MATERIALS OF LIMESTONE ORIGIN

- Cumberland silt loam, level phase
- Cumberland silt loam, undulating phase
- Cumberland silty clay loam, eroded undulating phase
- Christian loam, eroded undulating phase
- Christian loam, undulating phase
- Decatur silt loam, undulating phase
- Decatur silty clay loam, eroded undulating phase
- Dewey cherty silt loam, undulating phase
- Dewey cherty silty clay loam, eroded undulating phase
- Dewey silt loam, undulating phase
- Dewey silty clay loam, eroded undulating phase
- Etowah loam, level phase
- Etowah loam, undulating phase
- Etowah silty clay loam, eroded undulating phase

MANAGEMENT GROUP 8—ROLLING, MODERATELY ERODED, DEEP, MODERATELY PERMEABLE SOILS FROM MATERIALS OF LIMESTONE ORIGIN

- Dewey cherty silty clay loam, eroded rolling phase
- Dewey silty clay loam, eroded rolling phase
- Christian loam, eroded rolling phase

MANAGEMENT GROUP 9—ROLLING SEVERELY ERODED SOILS FROM MATERIALS OF LIMESTONE ORIGIN

- Christian clay loam, severely eroded rolling phase
- Cumberland silty clay loam, severely eroded rolling phase
- Decatur silty clay loam, severely eroded rolling phase
- Pearman silty clay loam, severely eroded rolling phase
- Talbott silty clay loam, severely eroded rolling phase

MANAGEMENT GROUP 10—ROLLING, MODERATELY SHALLOW SLOWLY PERMEABLE SOILS CHIEFLY FROM MATERIALS OF LIMESTONE ORIGIN

- Colbert cherty silt loam, rolling phase
- Colbert loam, eroded rolling phase
- Colbert loam, rolling phase
- Colbert silty clay loam, eroded rolling phase
- Pearman loam, eroded rolling phase
- Talbott cherty silty clay loam, eroded rolling phase
- Talbott loam, eroded rolling phase
- Talbott silty clay loam, eroded rolling phase

MANAGEMENT GROUP 11—UNDULATING SLOWLY PERMEABLE MODERATELY SHALLOW MEDIUM-TEXTURED SOILS FROM MATERIALS OF LIMESTONE ORIGIN

- Colbert loam, eroded undulating phase
- Colbert loam, undulating phase
- Colbert silt loam, level phase
- Colbert silt loam, undulating phase
- Pearman loam, eroded undulating phase
- Pearman loam, undulating phase
- Talbott loam, eroded undulating phase
- Talbott silt loam, undulating phase

MANAGEMENT GROUP 12—UNDULATING SLOWLY PERMEABLE MODERATELY SHALLOW, MODERATELY FINE-TEXTURED SOILS FROM MATERIALS OF LIMESTONE ORIGIN

- Colbert silty clay loam, eroded undulating phase
- Talbott silty clay loam, eroded undulating phase

MANAGEMENT GROUP 13—HILLY SLOWLY PERMEABLE SOILS FROM MATERIALS OF LIMESTONE ORIGIN

- Colbert loam, hilly phase
- Dewey silty clay loam, eroded hilly phase
- Talbott silty clay loam, eroded hilly phase
- Talbott cherty silty clay loam, eroded hilly phase

MANAGEMENT GROUP 14—UNDULATING PERMEABLE SOILS CHIEFLY FROM MATERIALS OF SANDSTONE ORIGIN

- Allen fine sandy loam, eroded undulating phase
- Allen fine sandy loam, undulating phase
- Crossville loam, undulating phase
- Enders loam, eroded undulating phase
- Enders loam, undulating phase
- Hanceville fine sandy loam, eroded undulating phase
- Hanceville fine sandy loam, undulating phase
- Hartselle fine sandy loam, eroded undulating phase
- Hartselle fine sandy loam, undulating phase
- Hartselle fine sandy loam, undulating shallow phase
- Hartselle loam, undulating phase
- Holston fine sandy loam, eroded undulating phase
- Holston fine sandy loam, level phase
- Holston fine sandy loam, undulating phase
- Holston gravelly fine sandy loam, eroded undulating phase
- Holston gravelly fine sandy loam, undulating phase
- Jefferson fine sandy loam, eroded undulating phase
- Jefferson fine sandy loam, undulating phase
- Linker fine sandy loam, eroded undulating phase
- Linker fine sandy loam, undulating phase
- Nolichucky fine sandy loam, eroded undulating phase
- Nolichucky fine sandy loam, undulating phase
- Nolichucky gravelly fine sandy loam, eroded undulating phase
- Sequatchie fine sandy loam
- Sequatchie fine sandy loam, eroded phase
- Tilsit silt loam, eroded undulating phase
- Tilsit silt loam, level phase
- Tilsit silt loam, undulating phase
- Waynesboro fine sandy loam, eroded undulating phase
- Waynesboro fine sandy loam, undulating phase

MANAGEMENT GROUP 15—ROLLING PERMEABLE NONSTONY UNERODED AND MODERATELY ERODED SOILS CHIEFLY FROM MATERIALS OF SANDSTONE ORIGIN

- Allen fine sandy loam, eroded rolling phase
- Allen fine sandy loam, rolling phase
- Enders loam, eroding rolling phase
- Enders loam, rolling phase
- Hanceville fine sandy loam, eroded rolling phase
- Hartselle fine sandy loam, eroded rolling phase
- Hartselle fine sandy loam, eroded rolling shallow phase
- Hartselle fine sandy loam, rolling phase
- Hartselle fine sandy loam, rolling shallow phase
- Holston gravelly fine sandy loam, eroded rolling phase
- Holston gravelly fine sandy loam, rolling phase
- Jefferson fine sandy loam, eroded rolling phase
- Jefferson fine sandy loam, rolling phase
- Linker fine sandy loam, eroded rolling phase
- Linker fine sandy loam, rolling phase
- Nolichucky gravelly fine sandy loam, eroded rolling phase
- Nolichucky gravelly fine sandy loam, rolling phase
- Tilsit silt loam, eroded rolling phase
- Tilsit silt loam, rolling phase
- Waynesboro fine sandy loam, eroded rolling phase

MANAGEMENT GROUP 16—HILLY PERMEABLE NONSTONY SOILS CHIEFLY FROM MATERIALS OF SANDSTONE ORIGIN

- Allen fine sandy loam, eroded hilly phase
- Allen fine sandy loam, hilly phase
- Allen fine sandy loam, severely eroded hilly phase
- Hector fine sandy loam, eroded hilly phase
- Hector fine sandy loam, hilly phase
- Hector fine sandy loam, severely eroded hilly phase
- Linker fine sandy loam, eroded hilly phase
- Muskingum fine sandy loam, eroded hilly phase
- Muskingum fine sandy loam, hilly phase
- Nolichucky gravelly fine sandy loam, hilly phase

MANAGEMENT GROUP 17—HILLY AND ROLLING PERMEABLE STONY SOILS CHIEFLY FROM MATERIALS OF SANDSTONE ORIGIN

- Allen stony fine sandy loam, eroded rolling phase
- Allen stony fine sandy loam, hilly phase
- Hector stony fine sandy loam, eroded hilly phase
- Hector stony fine sandy loam, hilly phase
- Muskingum stony fine sandy loam, eroded hilly phase
- Muskingum stony fine sandy loam, hilly phase
- Muskingum stony fine sandy loam, rolling phase
- Pottsville shaly silt loam, eroded hilly phase
- Pottsville shaly silt loam, hilly phase

MANAGEMENT GROUP 18—ROLLING PERMEABLE NONSTONY SEVERELY ERODED SOILS CHIEFLY FROM MATERIALS OF SANDSTONE ORIGIN

- Allen fine sandy loam, severely eroded rolling phase
- Hanceville loam, severely eroded rolling phase
- Linker loam, severely eroded rolling phase
- Tilsit clay loam, severely eroded rolling phase
- Waynesboro fine sandy loam, severely eroded rolling phase

MANAGEMENT GROUP 19—UNERODED STEEP SHALLOW STONY SOILS AND SEVERELY ERODED HILLY SHALLOW STONY SOILS FROM MATERIALS OF SANDSTONE AND SHALE ORIGIN

- Hector stony fine sandy loam, steep phase
- Muskingum stony fine sandy loam, steep phase
- Pottsville shaly silt loam, severely eroded hilly phase
- Pottsville shaly silt loam, steep phase

MANAGEMENT GROUP 20—SMOOTH AND ROLLING STONY AND COBBLY LAND TYPES FROM MATERIALS OF LIMESTONE AND SANDSTONE ORIGIN

- Cobbly colluvium (Jefferson soil material)
- Stony rolling land (Talbott and Colbert soil materials)
- Stony smooth land (Talbott and Colbert soil materials)

MANAGEMENT GROUP 21—LIMESTONE ROCKLAND, ROUGH GULLIED LAND, AND ROUGH STONY LAND

- Limestone rockland, rolling
- Limestone rockland, rough
- Rough gullied land (Decatur and Cumberland soil materials)
- Rough gullied land (Linker and Hartselle soil materials)
- Stony rough land (Muskingum soil materials)

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W. H. Allaway, Chief Analyst, Soil Uses and Productivity.
Roy W. Simonson, Principal Soil Correlator, Southern States.
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Soils surveyed 1941-44 by Hoyt Sherard, In Charge, C. L. McIntyre, H. J. Wesson, and R. S. Farnham, Alabama Department of Agriculture and Industries, and G. A. Swenson, A. H. Hasty, and Robert Wildermuth, U. S. Department of Agriculture.

Scale 1:15,840

1 0 1 2 Miles
5 000 0 5 000 10 000 Feet

☆ U. S. GOVERNMENT PRINTING OFFICE: 1958 O—386486

DIAGRAM
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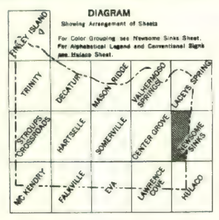


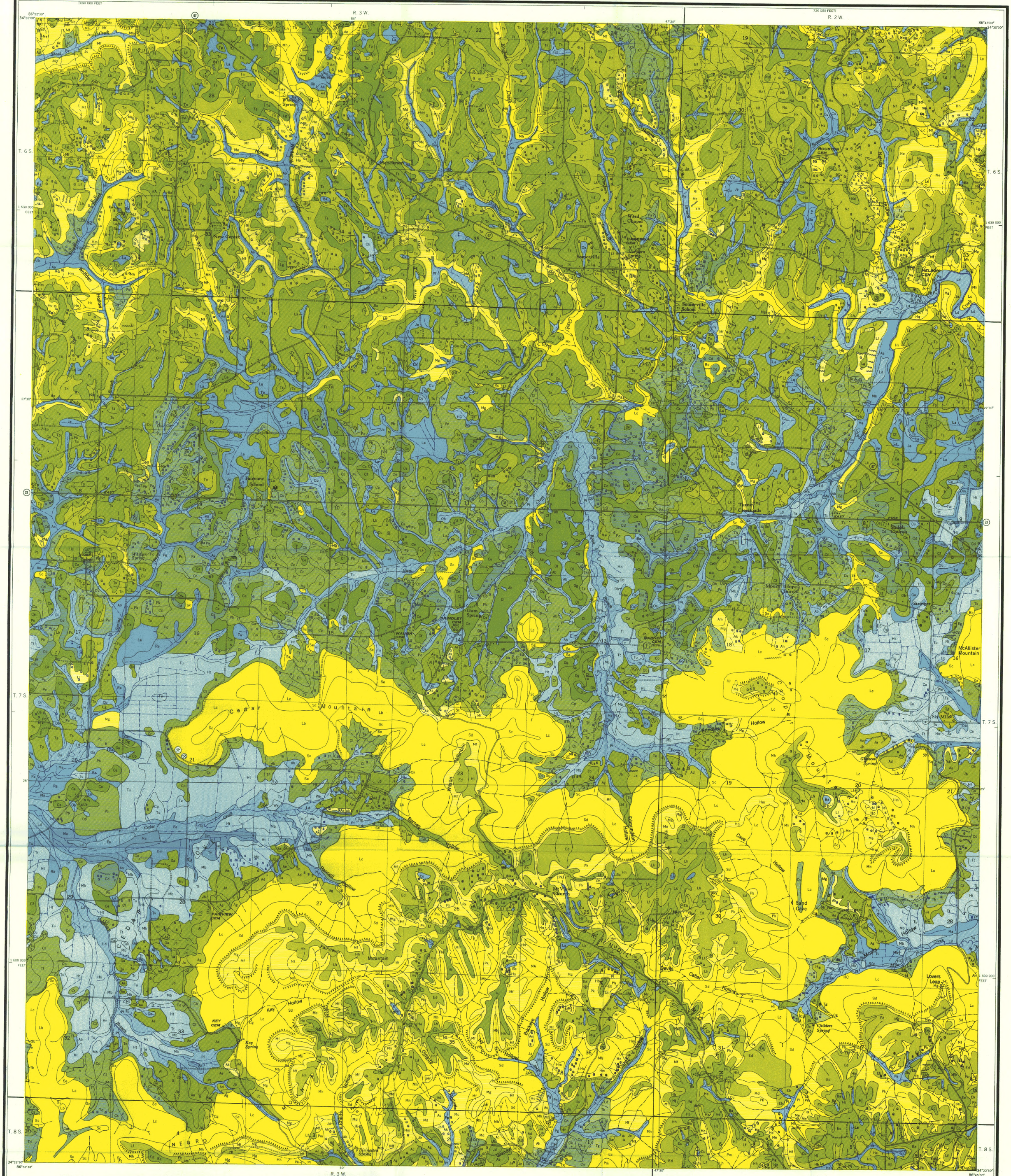
For Color Grouping see Newsome Sinks Sheet.
For Alphabetical Legend and Conventional Signs see Walnut Sheet.

Map constructed by Division of Cartography, Soil Conservation Service, USDA, from TVA topographic and planimetric quadrangles.
Soils surveyed on 1937 aerial photographs.
Polyconic projection, 1927 North American datum.
10 000-foot grid based on Alabama, (West) rectangular coordinate system.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY—ALABAMA
SOMERVILLE QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY



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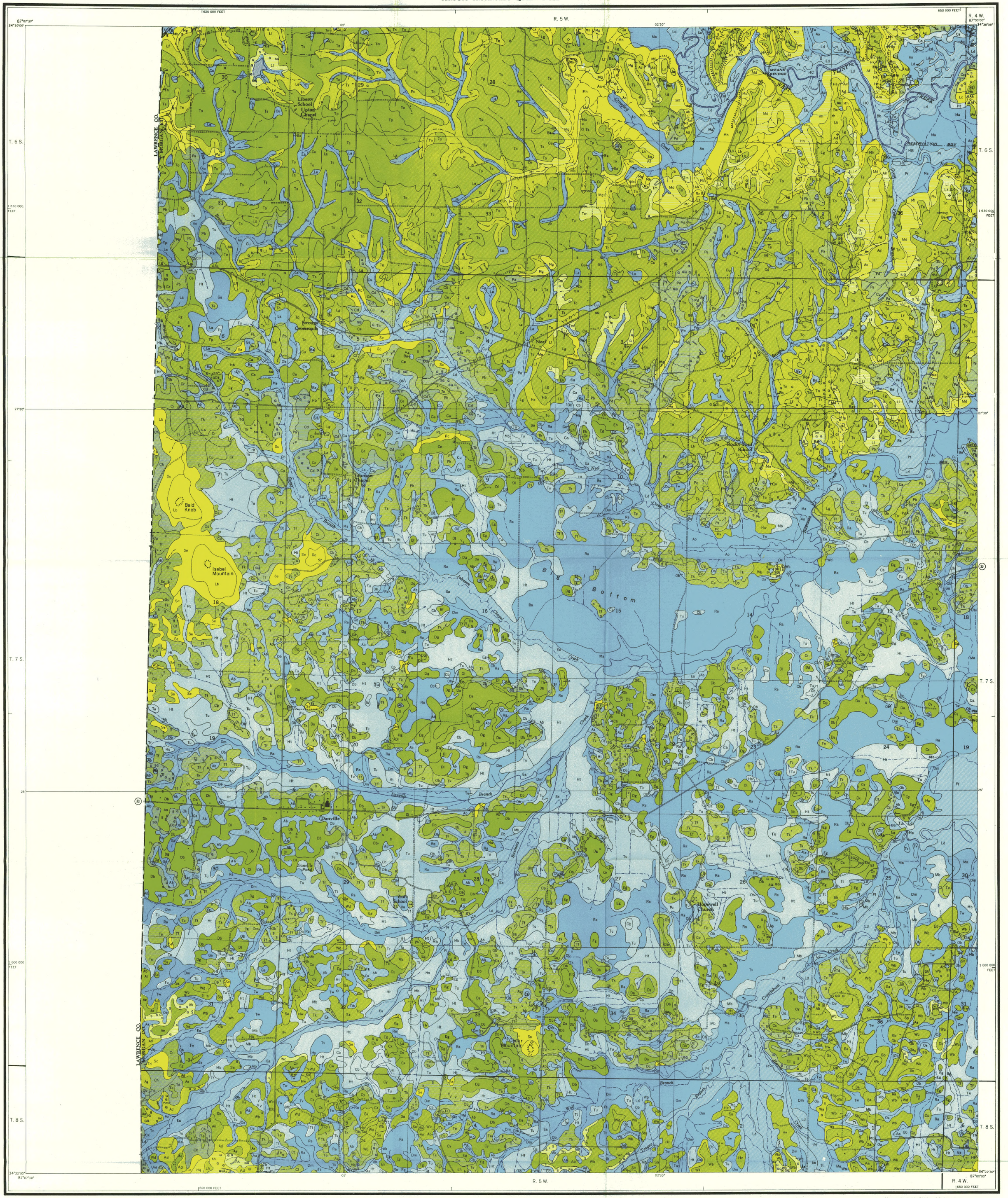
Map constructed by Division of Cartography, Soil Conservation Service, USDA, from TVA topographic and planimetric quadrangles.
Soils surveyed on 1937 aerial photographs.
Polyconic projection, 1927 North American datum, 10000-foot grid based on Alabama (West) rectangular coordinate system.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1958 O—386488

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY–ALABAMA
STROUPS CROSSROADS QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY



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1 ½ 0 1 2 Miles
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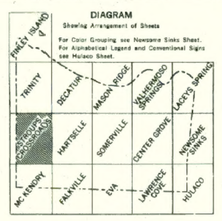
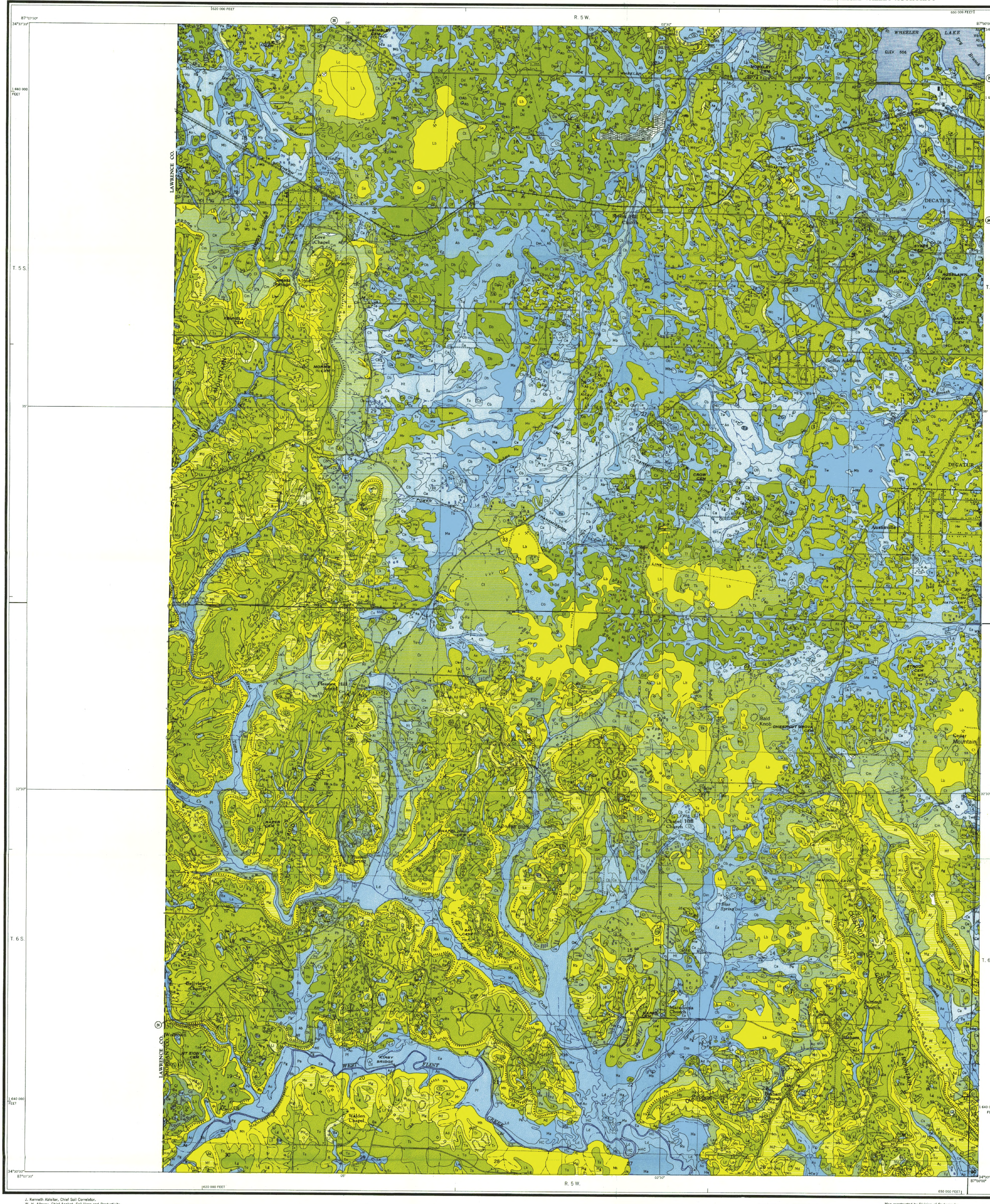


Map constructed by Division of Cartography, Soil Conservation Service, USDA, from TVA topographic and planimetric quadrangles.
Soils surveyed on 1937 aerial photographs.
Polyconic projection, 1927 North American datum.
10000-foot grid based on Alabama (West) rectangular coordinate system.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY–ALABAMA
TRINITY QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY



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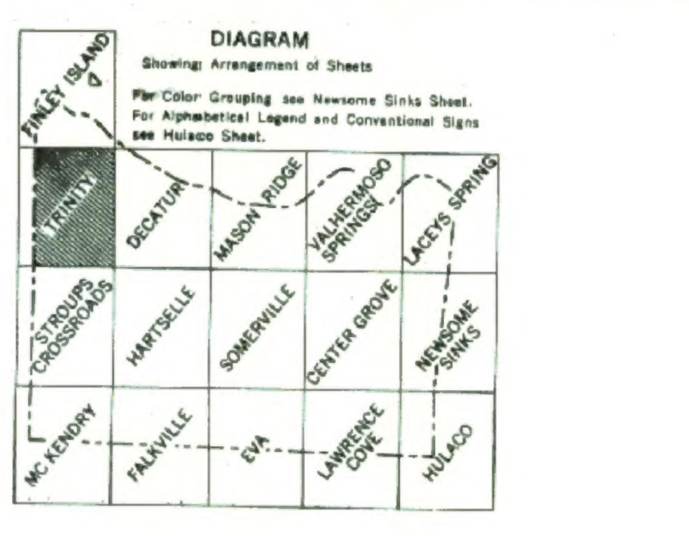


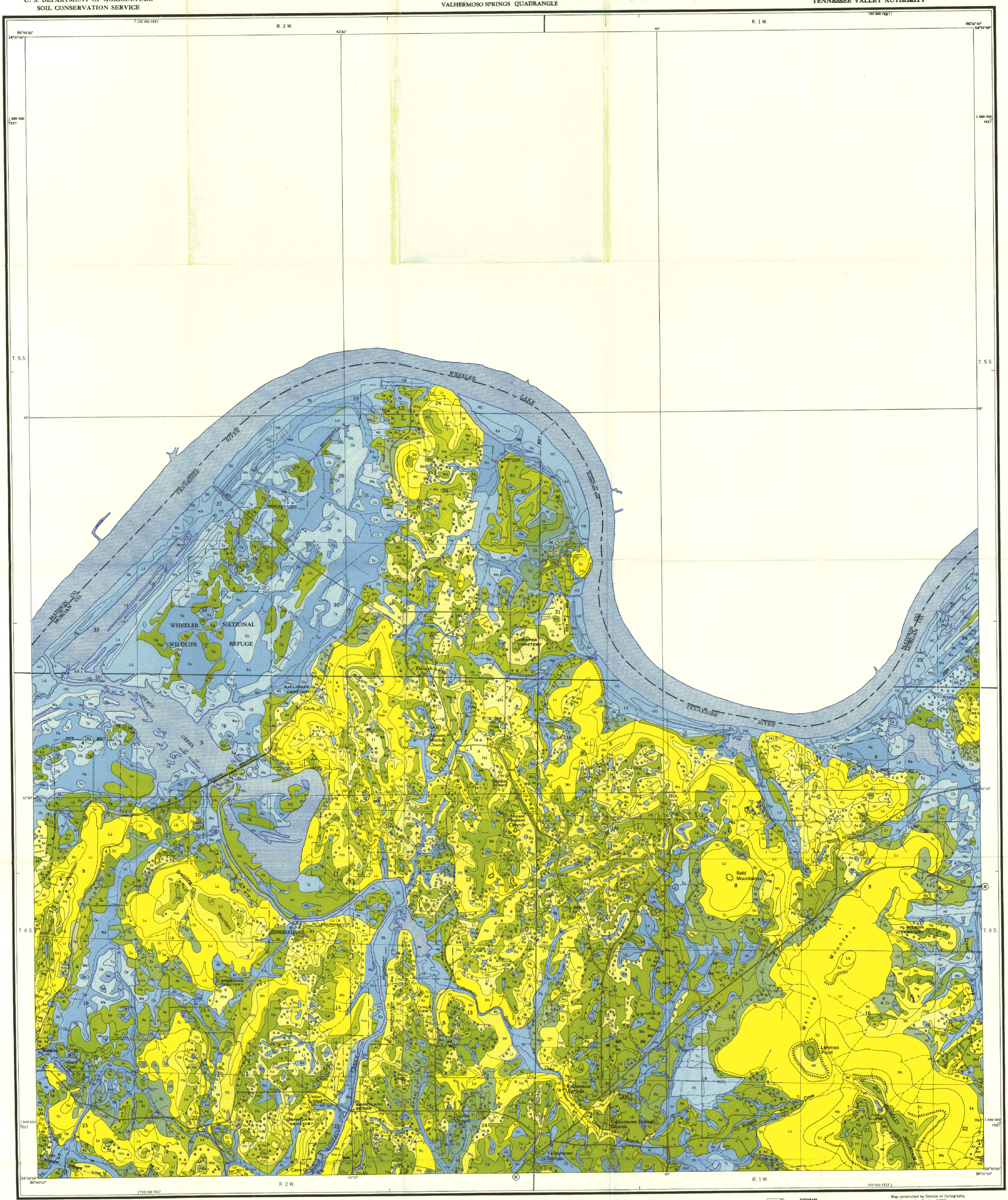
Map constructed by Division of Cartography, Soil Conservation Service, USDA, from TVA topographic and planimetric quadrangles. Soils surveyed on 1937 aerial photographs. Polyconic projection, 1927 North American datum. 10 000-foot grid based on Alabama (West) rectangular coordinate system.

MORGAN CO. ALA.
SOIL MAP
TRINITY
CULTURE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
MORGAN COUNTY—ALABAMA
VALHERMOSO SPRINGS QUADRANGLE

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
TENNESSEE VALLEY AUTHORITY



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1 ½ 0 1 2 Miles
5 000 0 5 000 10 000 Feet

☆ U. S. GOVERNMENT PRINTING OFFICE: 1958 O—394489

DIAGRAM
Showing Arrangement of Sheets
For Color Grouping see Newsome Sinks Sheet.
For Alphabetical Legend and Conventional Signs see Hobeso Sheet.

Map constructed by Division of Cartography, Soil Conservation Service, USDA, from TVA topographic and planimetric quadrangles. Soils surveyed on 1937 aerial photographs. Polyconic projection, 1927 North American datum. 10 000-foot grid based on Alabama (West) rectangular coordinate system.